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PROCEEDNGS OF THE PHILADELPHIA BOTANICAL CLUB

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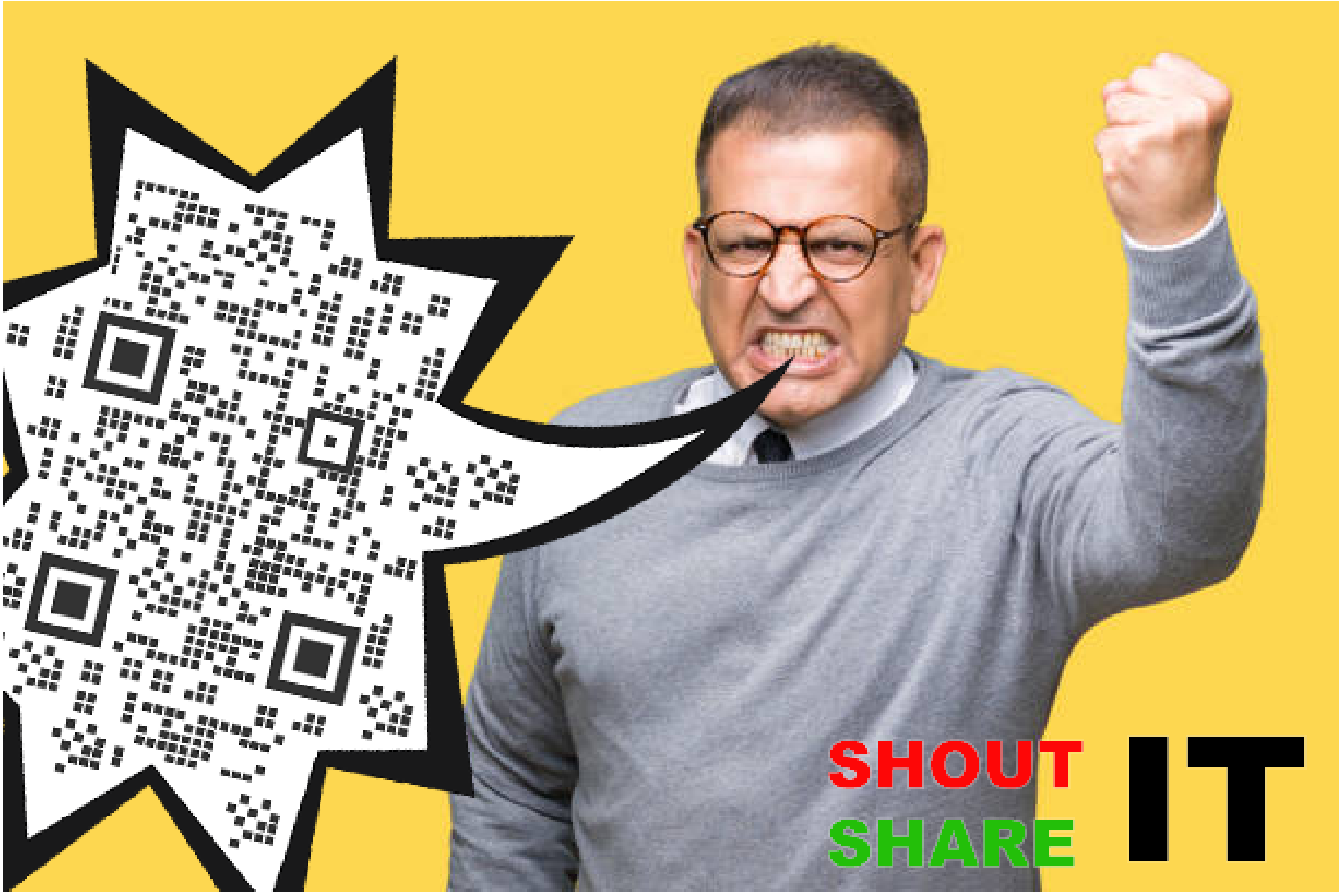
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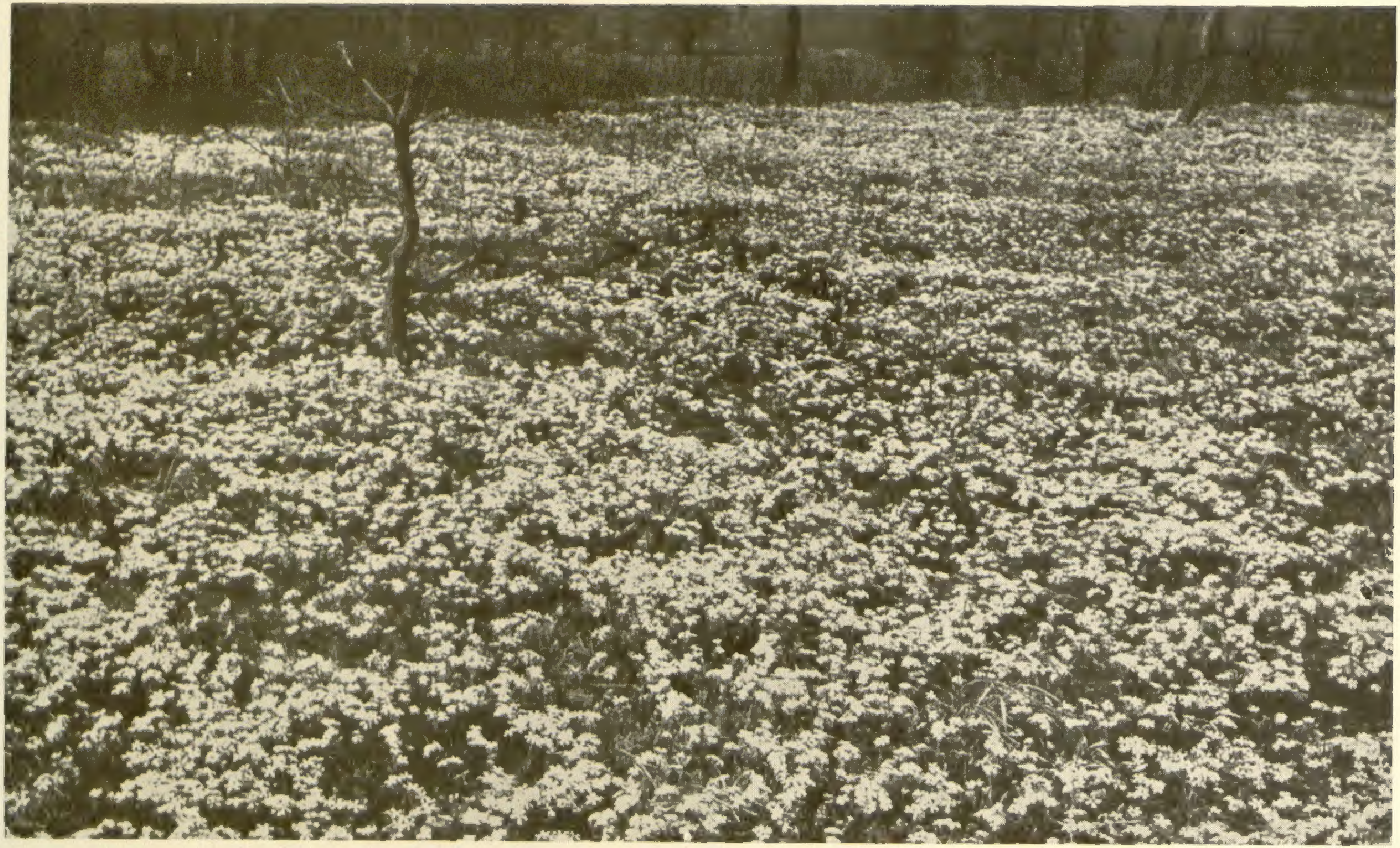

Phlox subulata on serpentine barren, Unionville, Pennsylvania.

BARTONIA

PROCEEDINGS OF THE PHILADELPHIA
BOTANICAL CLUB

No. 11 PHILADELPHIA, PA. 1928–1929

Picking Out the Polemoniaceae[1]

EDGAR T. WHERRY

For several years past the Philadelphia Botanical Club has honored me by invitations to speak at their December meetings, and I have always been glad to accept, to renew acquaintances with old friends, and to tell something of my field trips of the preceding seasons. Previous talks have covered various regions and certain individual genera or species which have received particular attention. Now, however, I have selected one plant family for detailed investigation, and here propose to explain how my choice was made.

In the Spring of 1901 I was a junior student in the scientific course at Friends' Central School, then located at 15th and Race Streets, and one of the things the members of the class had to do was to make a diminutive herbarium of 25 species of native plants. For those of us who lived in the city and could not readily obtain specimens ourselves, the instructor, Horace L. Dilworth, of Centerville, Delaware (1864–1927), brought in every few days a vasculum full of material gathered in the surrounding country. On May 10th my share of the spoils was a clump of *Polemonium* from Chadd's Ford, Pennsylvania, which for some unaccountable reason fascinated me, so that I made special measurements upon it and compared them with the data in the manuals in our school library—old editions of

---

[1] Presented, together with an abstract of the following paper, at the meeting of the Philadelphia Botanical Club on December 27, 1928.

Gray and of Wood. In practically every respect it corresponded to their descriptions of *P. coeruleum,* and in writing it up on the record-sheet, I presented my conclusions to that effect. Mr. Dilworth assured me that this identification was incorrect, and I have ultimately come to agree with him, now recognizing that the characterizations of the species of this genus in the manuals are not altogether accurate.

During several subsequent years my attention was repeatedly directed to another member of the same plant family. Having decided to take up mineralogical chemistry as a profession, I began to make the rounds of localities in the vicinity of Philadelphia where mineral specimens were to be obtained. Whenever these expeditions led to the areas underlain by serpentine rock, in Chester and Delaware counties, in the Spring of the year, these "barrens" would be gay with the Moss Phlox, *Phlox subulata* (see frontispiece). Not only were the vast floral carpets exquisitely beautiful, but they also presented certain problems which aroused my scientific curiosity. One of these was botanical: the individual clumps showed the most marked variation in features from one to another, a phenomenon quite inadequately referred to in the literature. The other lay nearer to my immediate interests: the *Phlox* was so strictly limited to the serpentine outcrops that a geological map of the rock might have been made from observations on the plant alone; yet none of the scientists in whose company many of the trips were made could tell what feature favoring it was possessed by the serpentine but not by the surrounding gneiss or schist rocks. Accordingly I decided, should the opportunity ever come, to investigate the connection between the mineralogy or chemistry of soils and the plants which grew upon them. It was not until 1915 that I was able to take up any work of this sort, but the studies then begun have been continued ever since. The particular phase of the subject which proved most fruitful was the significance of soil acidity and alkalinity as ecological factors; and many interesting relationships soon came to light, some of which have been discussed at previous meetings of this Club. Tests of the soils which the

Phlox favors and avoids have shown no reaction-differences, however, and its restriction to serpentine seems to be connected merely with the extreme sterility of the soils derived from this rock.

The final incident which impelled me to undertake an intensive study of the *Polemoniaceae* was the rediscovery of a long-lost *Phlox,* and finding that its status had been misinterpreted. In carrying out work on the relations of soil reaction to plant distribution, all natives of possible horticultural value reported to be rare, local, or geographically erratic have been specially sought to see whether their peculiarities might be connected with preferences for unusual reactions. Of the successful searches, in company with various friends, for *Chelone obliqua,*[1] *Elliottia racemosa,*[2] *Gaylussacia brachycera,* etc., this Club has already heard; the stories of others remain to be chronicled, and here is the one of interest in the present connection. In 1870 Asa Gray, in his "Revision of the North American Polemoniaceae,"[3] described as new *Phlox stellaria,* from a specimen collected many years previously by Dr. C. W. Short. The locality from which this came had been recorded simply as "cliffs of Kentucky River," and Gray added the comments "probably above Lexington. . . . The station should be rediscovered." On the occasion of my first visit to Lexington, an acquaintance took me out to the gorge of the river, about 20 miles away, but no *Phlox* of any sort could be found on the cliffs at that point. Another year (1923) I was at Lexington again, and Professor Frank T. McFarland, of the Department of Botany of the State University, guided me to a different part of the river valley, at Camp Nelson. Here he had observed a peculiar *Phlox,* and this proved to be the "lost" one. The precipitous south-facing limestone ledges, though seemingly very barren, were gay with attractive wild flowers, of which I recall particularly an *Aquilegia,* an *Arenaria,* and a *Phacelia.* Here and there hung festoons a foot

[1] Bartonia 10: 1. 1929.

[2] Bartonia 9: 11. 1926 and 10: 24. 1929.

[3] Proc. Amer. Acad. Arts Sci. 8: 252. 1870.

or two in diameter, made up of slender woody stems clothed with leathery linear leaves about 2 inches in length. The date of the trip, May 17th, was too late to see the flowers on this plant at their best, but enough remained to show its identity: it was a *Phlox* with pallid violet to nearly white flowers having moderately notched corolla-lobes, as stated by Gray to be characteristic of his new species; yet the inflorescence-foliage was in general not glabrous, as he had said, but rather conspicuously pubescent, thus corresponding to the one given in the manuals as *P. bifida.* Examination of numerous festoons showed only two plants out of a hundred to really agree with Gray's description; and such plants grew so intermingled with variably pubescent ones that it would be meaningless to claim that two distinct species were represented. Because of scanty material and unfamiliarity with the field relations, Gray, who usually inclined toward "lumping," had in this case perpetrated a "splitting" instead; a rare and non-significant variant had been assigned specific rank.

Upon supplementing the above-described field observations with others made meanwhile and with a survey of the literature, it became plain that the *Polemoniaceae,* in spite of having been studied by a number of eminent authorities, were not yet adequately understood, at least as far as the eastern United States was concerned. This family, however, is a moderate-sized one, and almost entirely North American; its study could therefore be undertaken by someone with but limited time and funds to spend on botanical work. Many of its members are of horticultural value, yet no data as to their soil-reaction preferences were on record. Everything seemed to point toward the desirability of my taking it up as a subject for detailed investigation; and from 1926 on my field trips have been planned with this aim increasingly in view. Thus far, opportunity has permitted the working out of the relations in one section, that of the subulate-leaved species, and they are being made the subject of an article published on subsequent pages; it is hoped that similar treatments of other sections can be prepared in the near future.

The Eastern Subulate-leaved Phloxes

EDGAR T. WHERRY

The need for fuller information upon the eastern *Polemoniaceae* having been brought to my attention by the incidents related in the preceding paper,[1] the preparation of a technical treatment of these plants for publication in the "Contributions from the United States National Herbarium" has been undertaken. Only limited time being available for this, however, several years will necessarily elapse before its completion, and there will not be opportunity in such an article for detailed discussions of the history, field relationships, etc., of the species. It therefore seems desirable to place on record the results of my work along these lines upon small groups of species at a time, in separate papers.

It is planned to present these data under the headings: history, geography, ecology, variation, and cultivation. The historical accounts are being worked up chiefly in the library of the U. S. Department of Agriculture. Information as to the geographic relations is being obtained from the collections in six of the country's larger herbaria: Academy of Natural Sciences of Philadelphia, Field Museum of Natural History, Gray Herbarium, Missouri Botanical Garden, New York Botanical Garden, and U. S. National Herbarium, and various smaller ones;[2] also from the literature and a few weeks' field work each year.[1] Alphabetical lists of the states and counties from which the various species are known are given, and in order to bring out the extent to which descriptions are based on field observations, counties in which fresh material has been seen are marked by ^{f}. Under ecology are described habitat, blooming period, mode of pollination, etc.

---

[1] Bartonia 11: 1. 1929.

[2] Data on the section covered in this paper have been obtained also from the herbaria of: Carnegie Museum (Pittsburgh), Cornell University, Charles C. Deam (Bluffton, Indiana), Kentucky Agricultural Experiment Station, Maryland Academy of Sciences, Michigan State College, New York State Museum (Albany), North Carolina State College (Raleigh), Ohio State University, University of Illinois, University of Kentucky, University of North Carolina, University of Pennsylvania, University of Tennessee, and University of Virginia. My sincere thanks are hereby extended to the curators of these collections for their kindness in facilitating my work in every way, including the shipping of specimens when personal visits were impracticable.

The treatment of variation requires fuller discussion. Many eastern members of the *Polemoniaceae* vary markedly from one plant to another within single colonies, as well as from one colony to the next, in numerous different characters. The more conspicuous of these, in the genus *Phlox,* are enumerated here; it is understood that in individual cases the extremes lie within certain limits, so that for example "long style" in one species may represent a lesser absolute length than "short style" in another. In some cases the variation is gradual, all stages from one extreme to its complement being recognizable; in others definite mutations are represented.

Habit: tall to short; in low-growing species, lax to dense.

Leaves: wide to narrow, and long to short.

Inflorescence hairs: glandular or eglandular.

Calyx-lobes: long to short.

Corolla-color: reddish to bluish purple (violet); deep to pale; in pale variants, the tube showing more color than the limb, but the latter deepening as the flowers fade; striae at the bases of the lobes varying similarly, though independently of the limb-color; complete albinos, without trace of color in any part of the corolla, occasional.

Corolla-dimensions: tube long to short; lobes long to short and wide to narrow; lobe-tips rounded, acuminate, or in certain species emarginate; in the last case, segments obtuse to acutish, and sinuses shallow to deep and broad to narrow.

Style: long to short.

Selecting the genus *Phlox* for the first subject, the question as to how it might best be subdivided was considered. On reviewing the literature it was found that Peter[2] had recognized among the eastern species five sections, which, appearing to express the actual relations better than any groups proposed by other writers, have accordingly been adopted. As in general evergreens with more or less isolated flowers seem to be the more primitive, his section *Subulatae,* comprising plants of this type, has been taken up first. Its members are characterized by having woody, trailing-decumbent stems, narrow persistent leaves, and cymes of few rather long-pedicelled flowers. Although at least seven names have been proposed for species east of the Mississippi River, detailed study indicates that but three of these can be maintained as distinct.

---

[1] A set of the specimens collected is being deposited in the herbarium of the Academy of Natural Sciences of Philadelphia.

[2] In Engler & Prantl's Pflanzenfamilien 4^{3a}: 46. 1891.

PHLOX, SECTION SUBULATAE: KEY TO SPECIES

Corolla-lobes entire, erose, or rather shallowly notched; stamens all included; style 0.5–3 mm. long; ovules 1–3 per cell........................1. *P. nivalis*
Corolla-lobes deeply notched or exceptionally entire; stamens in part exserted; style 4–12 mm. long; ovule normally 1 per cell.
  Nodes numerous, crowded; lower leaves 8–20 mm. long; sinuses in the corolla-lobes averaging 1 mm. deep..................................2. *P. subulata*
  Nodes few, more remote; lower leaves 20–60 mm. long; sinuses in the corolla-lobes averaging 3 mm. deep..3. *P. bifida*

Supplementary distinguishing features between *P. nivalis* and *P. subulata,* which have been confused by many botanists, are that the former frequently exhibits longer, less matted stems; sparser and taller flowering shoots; and larger leaves, calyces, and corollas. Final proof that they are distinct is furnished by their occupation of quite different ranges.

Field observations on the members of the *Subulatae* were at first made incidentally, in the course of trips directed toward other objectives, but after the study of the section was actively under way, special visits were made to their areas. For instance, in May, 1928, in company with Mr. J. E. Benedict, Jr., the Piedmont of Georgia, South and North Carolina, and Virginia was traversed by automobile. In but 20 hours total running time, *Phlox nivalis* was collected in 12 counties, less than half of which had previously been represented by specimens in herbaria. There seems every reason to expect that similar trips through other portions of these states would have led to its discovery in many additional counties, although its range is now so well known that further search is unnecessary.

1. **Phlox nivalis** Loddiges. TRAILING PHLOX. Plate 2.

History.—The earliest known reference to this species is in Plukenet's "Phytographia,"[1] published in 1691; figure 2 of his plate 98 shows a plant with the corolla-lobes shallowly notched, the stamens all included, and the style about 1 mm. long (inferred from the position of the stigma-tips, barely exserted beyond the calyx-lobes). He characterized it as "Lychnidaea Blattariae accedens Virginiana minor, repens hirsutis Camphoratae foliis, floribus fistulosis, in Umbellam positis." The drawing was evidently made from fresh (cultivated) material, since it shows striae at the bases of the corolla-lobes, which usually disappear on drying; but there is, unfortunately, no record as to when or by whom it was introduced into England, or whether indeed it really came from Virginia at all.

In proposing the name *Phlox subulata,* Linné[2] cited the above reference to Plukenet, but evidently based the description on a specimen in his herbarium, which, according to Jackson,[3] was in his possession prior to the publication of the "Species Plantarum." Data on this specimen show it to represent the quite distinct species here taken up second, as further discussed in connection with the latter. When two things are covered by a single name, the most reasonable procedure would appear to be to allot this name to the one represented by a specimen used in drawing up the description, rather than to that referred to in a citation.

Failure to recognize this composite character of the Linnean *P. subulata* has led to considerable misunderstanding as to the relations and distributions of the species. Thus, the *Phlox subulata* listed by Walter[4] in his "Flora Caroliniana" must have been the species covered by the Plukenet citation, for that occurs throughout South Carolina, whereas the one of the Linnean herbarium, if native to the state at all, would be limited to the highest mountains.

---

[1] Phytographia pl. 98, fig. 2. 1691.

[2] Species Plantarum (1): 152. 1753.

[3] Index Linnean Herbarium; Suppl. Proc. Linn. Soc. 124: 116. 1912.

[4] Flora Caroliniana 96. 1788.

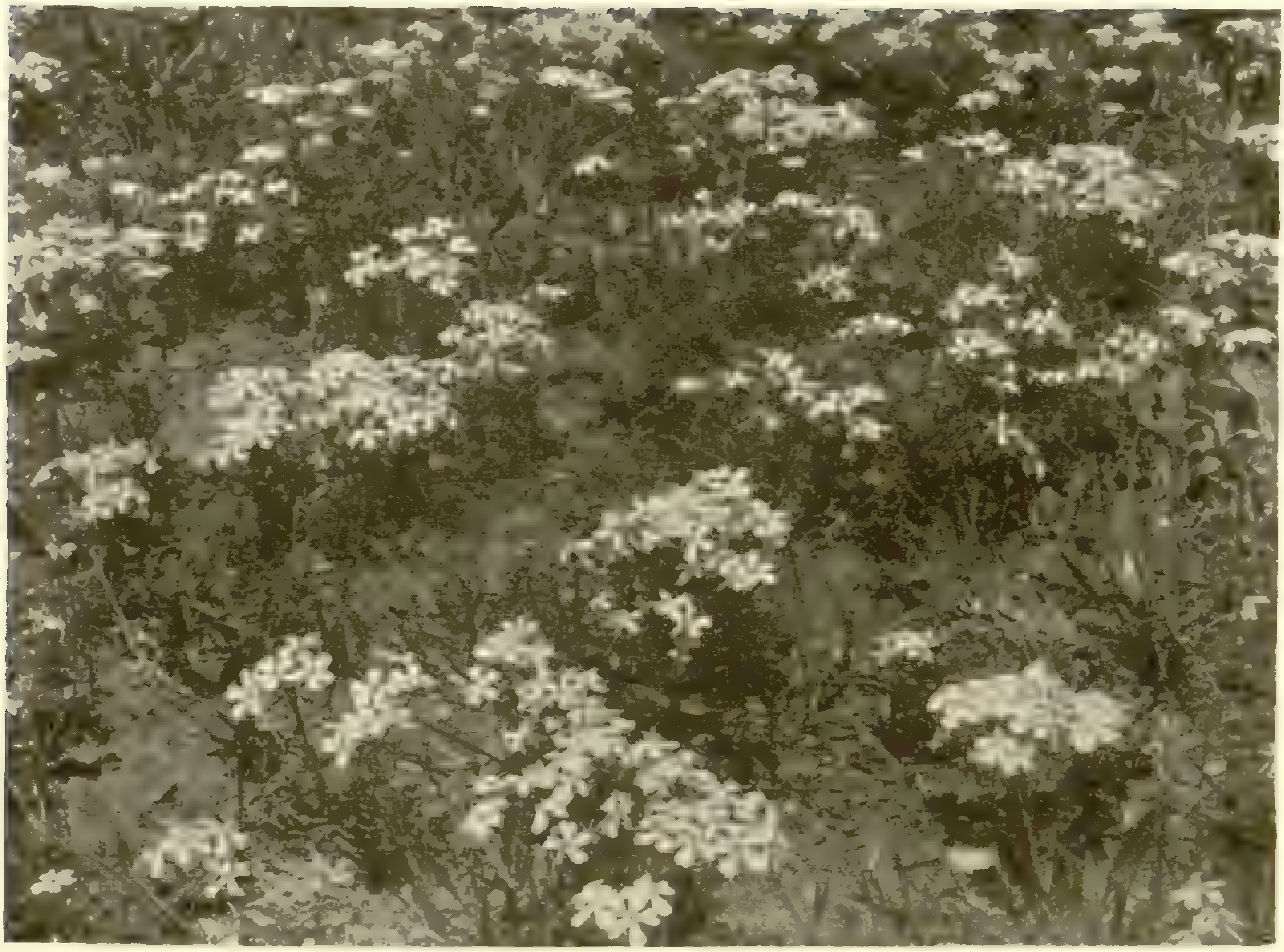

FIG. 1. *Phlox nivalis*, Blacksburg, South Carolina.

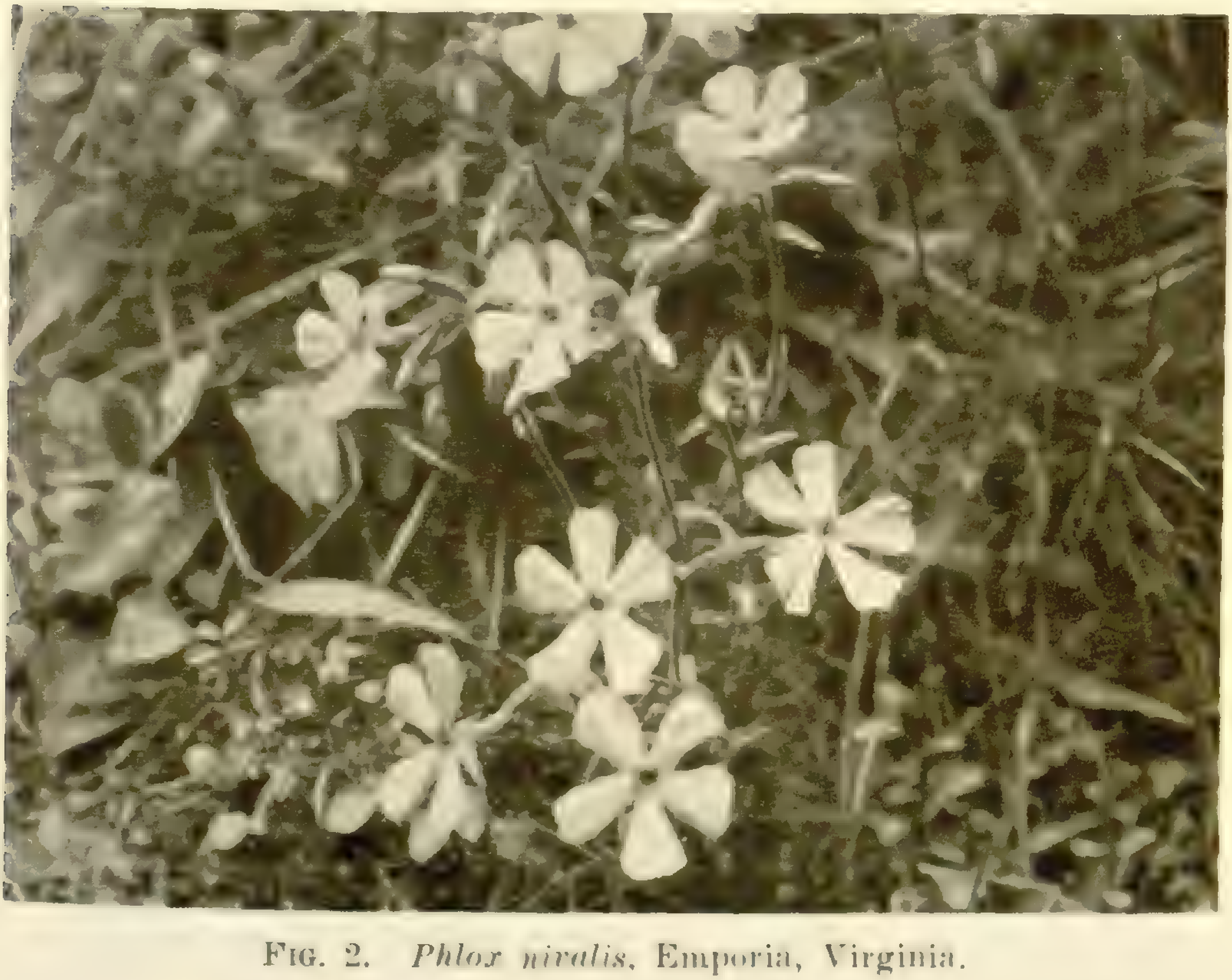

FIG. 2. *Phlox nivalis*, Emporia, Virginia.

That the two species are distinct was first recognized by Curtis[1] in 1798, but he got the nomenclature twisted. His plate clearly represents the one here being discussed, both in having shallowly notched corolla-lobes and included stamens, and in its flowers and leaves being much larger than is typical of *Phlox subulata.* He stated, too, that it had been "brought from Carolina by Mr. John Fraser in 1788," no doubt from one of Walter's localities. The name he applied to it, however, was *P. setacea,* which had been assigned by Linné to a small, glabrate individual of *P. subulata,* as will be shown below. How confused Curtis was is brought out by the fact that he said in the text that the leaves were "finer and more hairy than those of the *subulata*"; yet his figure shows them much coarser, and Linné's characterization of *P. setacea,* which he actually quoted, emphasized their glabrousness. Unfortunately, when Curtis's material got into the British horticultural trade, it was named in accordance with his erroneous application of "*setacea,*" and that name has been retained to this day in garden manuals and nursery catalogs, although it has practically disappeared from botanical literature, at least as a species designation.

In 1809 Jacquin[2] included in his "Fragmenta Botanica" an excellent description and figure of what he termed *Phlox subulata.* Inspection of the copy of this rare work in the library of the New York Botanical Garden showed that the plant referred to is the species here under discussion. It was ascribed to "Virginia," but was being grown in France in the greenhouse, so more probably came from the Carolinas.

The earliest independent name proposed for the present species is *Phlox nivalis,* which was published in Loddiges's "Botanical Cabinet"[3] in 1823. The accompanying plate shows shallowly notched corolla-lobes and included stamens; the corolla-color is very pale, the name seemingly referring to a snow-like appearance of clumps covered with flowers. The stature is shorter than usual for this species, but that may have been due to the figure being made from material cultivated under unfavorable conditions. At any rate, the notes given as to its source make its identity evident: "This is a native of Carolina and Georgia. It was sent to us by . . . Dr. Wray, of Augusta. . . . It is probably not quite hardy." The very hardy *P. subulata,* although it may occur in the mountains of these states, certainly does not grow near Augusta, whereas this other species, with frequent pallid color-forms, has been repeatedly collected there. Moreover, not long afterward, Sweet[1] published a plate in which the interior of a flower was figured, the stamens being shown as deeply included, and the style as 2.5 mm. long. Final confirmation was unwittingly furnished by Gray,[2] who, although treating *P. nivalis* as a mere form of *P. subulata,* fortunately recorded his observa- that it has "ovules commonly, but not always, in pairs (rarely 3) in each cell."

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[1] Botanical Magazine 12: pl. 415. 1798.

[2] Fragmenta Botanica 39, pl. 44, fig. 4. 1809.

[3] Botanical Cabinet 8: pl. 780. 1823.

A taller form of the same plant was subsequently figured by Loddiges,[3] but under the name *Phlox aristata,* which had already been used by Michaux[4] for a member of a different section, and is accordingly quite inacceptable.

Somewhat later the species was given a second distinctive name, *Phlox hentzii,* by Nuttall.[5] He may have been acquainted with the Loddiges publication, for the type sheet, preserved in the herbarium of the Academy of Natural Sciences of Philadelphia, is labelled in his handwriting *"Phlox nivea"*; but when he came to publish upon this, forgot about the prior name and dedicated it to its collector, who was presumably Nicholas M. Hentz, better known as the first American arachnologist than as a botanist.

Phlox hentzii was maintained as a distinct species by Bentham[6] in the earliest monograph of the *Polemoniaceae,* the prior name *nivalis* being overlooked. In the next treatment of the family, however, that by Gray,[1] all the names concerned were reduced to synonyms of *P. subulata;* and most subsequent authors have accepted this viewpoint.

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[1] British Flower Garden 2: pl. 185. 1827.

[2] Proc. Amer. Acad. Arts Sci. 8: 252. 1870.

[3] Botanical Cabinet 18: pl. 1731. 1831.

[4] Flora Boreali-Americana (1): 144. 1803.

[5] Journ. Acad. Nat. Sci. Phila. 7: 110. 1834.

[6] In De Candolle's Prodromus 9: 306. 1845.

A regrettable result of Gray's procedure was the misleading of Darwin[2] in his study of the correlation between style-length and pollen-grain size. In the heterostylous species he was studying, the pollen-grains of long-styled plants were consistently smaller than those of short-styled ones; but when he measured these two Phloxes, he found the short-styled *P. nivalis* to have smaller pollen than the long-styled *P. subulata.* Dismissing the possibility that they might be distinct species, because of Gray's pronouncement that they were the same, he spent much effort in discussing possible explanations, but was unable to reach any other conclusion than that "the whole case is perplexing in the highest degree."

Bentham's view that two species are represented was revived by Small[3] many years later, and the data obtained in the course of the present study confirm the correctness of this interpretation. Both adopted Nuttall's name for the one under discussion here; since in spite of Loddiges's incomplete characterization of his *Phlox nivalis,* however, there can be no doubt as to what this name referred to, the rule of priority requires its use instead.

The third monographer of the family, Brand,[4] approached the matter differently. While including everything under a single species, he worked out an elaborate taxonomic system of supposed subspecies, varieties, and subvarieties, his complete name for Nuttall's material being, for example, "*Phlox subulata eusubulata ciliata hentzii.*" As, however, he erroneously stated its calyx to be eglandular and its corolla-lobes entire, and made similar mistakes in other cases, his scheme of classification is quite inacceptable.

---

[1] Proc. Amer. Acad. Arts Sci. 8: 247. 1870.

[2] Forms of Flowers 120. 1877.

[3] Flora S.E. U. S. 978. 1903.

[4] In Engler's Pflanzenreich IV. 250: 78. 1907.

Geography.—*Phlox nivalis* occurs in the Coastal Plain, Piedmont, and exceptionally Blue Ridge,[1] from central peninsular Florida to central Alabama, western North Carolina, and southernmost Virginia. This is brought out graphically by the map, fig. 1, which bears a dot for each county in which it is recorded. No relation to the Fall-line (the cross-hatched band) is shown, but the mountain-front (line of Λ's) is evidently a nearly complete barrier to this plant.

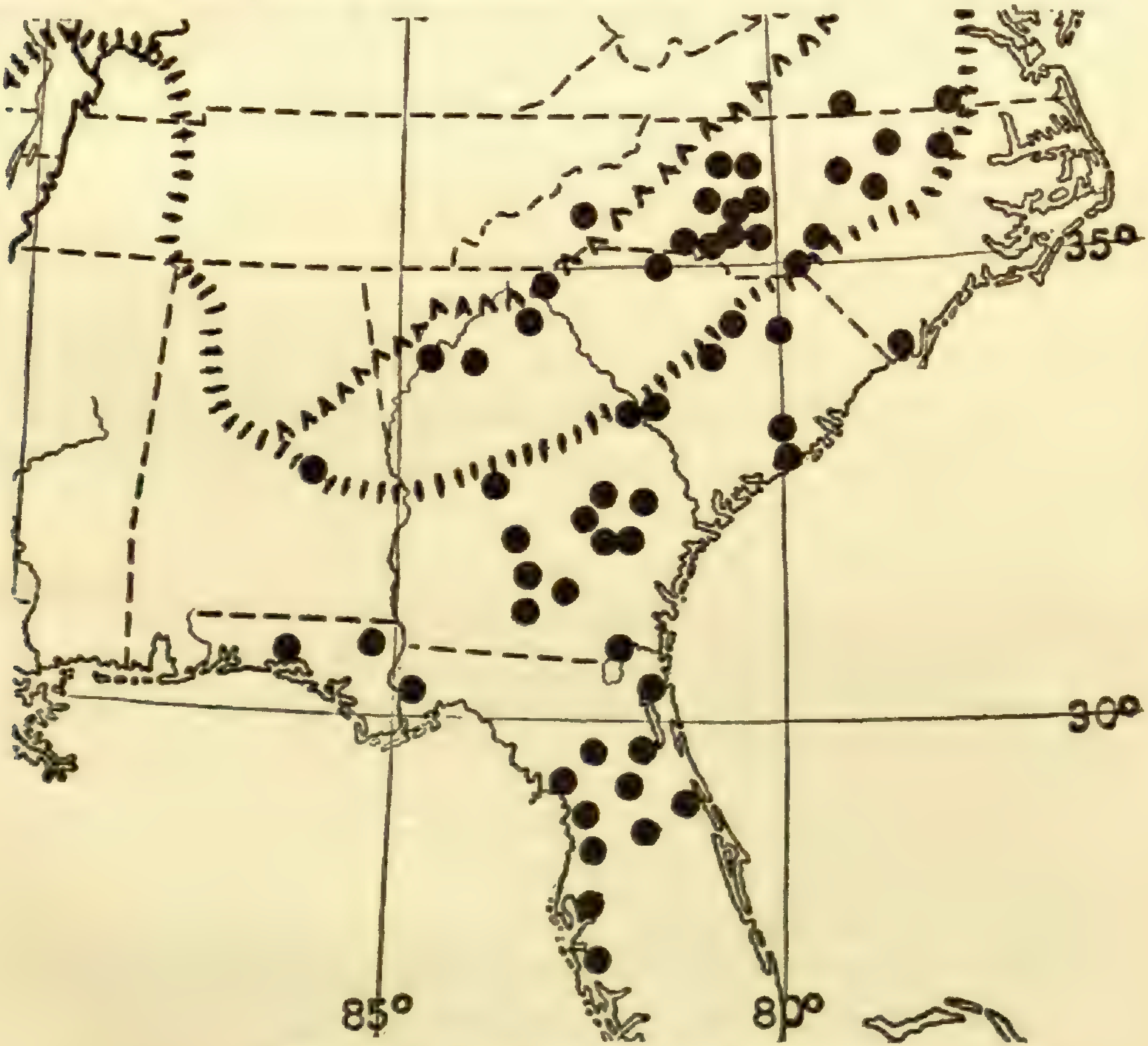

Fig. 1. Distribution of *Phlox nivalis.*

Alabama: Certainly known from but a single locality in the Coastal Plain, where discovered by Dr. Roland M. Harper in 1927 in Elmore County, 8 miles (13 km.) east of Wetumpka. A subulate-leaved *Phlox* reported on Montesano in Madison County by Mr. T. G. Harbison is probably the same, but no specimens have been seen.

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[1] Physiographic provinces are defined according to Fenneman, Ann. Assoc. Amer. Geogr. 6: 19. 1917.

FLORIDA: Occasional north of latitude 27°, the following counties being represented in the material seen: Alachua, Citrus′, Duval, Hernando′, Hillsborough, Jackson, Lake, Levy, Liberty, Manatee, Marion, Putnam, Volusia, and Walton′. The southernmost point at which the species is known to have been collected is Palma Sola, Manatee County.

GEORGIA: Scattered throughout the state; a member of the Altamaha Grit flora, as noted by Harper.[1] The counties from which it is recorded are: Berrien, Bulloch, Charlton, Cobb′, Coffee, Emanuel, Franklin′, Gwinnett′, Irwin, Montgomery, Peach (recently created out of a part of Houston; specimens were kindly collected for me here by Mr. J. C. Dunegan), Richmond, Tattnall, Toombs, and Wilcox.

[MISSISSIPPI: Chapman[2] gave the range of "*Phlox subulata*" (which in his usage covered the present species) as extending into this state, but no specimens appear to be preserved. It is, moreover, not included in the flora by Lowe,[3] and Professor Lowe assures me that it has not been collected in recent years. Its occurrence here is thus questionable.]

NORTH CAROLINA: Frequent in the Piedmont, and rare in the Coastal Plain and Blue Ridge. Material has been seen from Brunswick, Buncombe, Cabarrus′, Davidson′, Forsyth′, Gaston′, Halifax, Iredell, Mecklenburg′, Moore′, Orange′, Richmond, Rowan′, Stanly, Vance, Wake′, and Yadkin counties. The highest elevation which the species is known to attain is 2,000 feet (610 meters) in Buncombe County.

SOUTH CAROLINA: Occasional throughout, being recorded from Aiken, Berkeley, Charleston, Cherokee′, Darlington, Kershaw′, Oconee, and Richland counties.

VIRGINIA: Early allusions, of doubtful validity, to the occurrence of this *Phlox* here have been noted above. It is known to grow at present in two counties, Greensville′ (in both Piedmont and Coastal Plain around Emporia), and Halifax′ (northeast of Clover, well back in the Piedmont). The latter is the northernmost point at which the species has yet been found, latitude 36° 50′.

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[1] Ann. N. Y. Acad. Sci. 17: 171. 1906.

[2] Flora Southern States 339. 1860.

[3] Plants of Miss. 233. 1921.

Ecology.—Throughout its range *Phlox nivalis* is typically an inhabitant of dry, thin oak or pine woods, exceptionally of damp meadows. Its soil is commonly a mixture of sand and clay, often rich in humus but at times rust-colored from the presence of iron hydroxides. By far the most frequent reaction observed has been subacid, the optimum for the species appearing to lie near active acidity 30. Values decidedly lower or higher than this have been noted but rarely, and neutrality only once, in Citrus county, Florida. The whole aspect of its habitats suggests sterility, and its depressed habit, woody stem, and small persistent leaves mark it as a moderate xerophyte.

In succession, this species appears to occupy an intermediate position, first appearing in a shrub-thicket stage, and dying out again as climax forest develops. It is fairly resistant to fire, rapidly producing new shoots on crowns from which the old stems have burned away. The boundary of its range on the north and northwest probably represents a climatic barrier, although why it does not extend farther along the Gulf coast is not evident.

Its chief blooming period covers March and April toward the southern end of the range, and April and May toward the northern end. Sporadic flowers sometimes appear both earlier and later, and in years marked by frequent alternations of cool and warm weather, a few may be produced in the Fall. The flowers are normally protandrous, the stigmas not becoming receptive until the pollen has been shed, so that self-pollination probably occurs but rarely in spite of the position of the stigmas below the anthers. Cross-pollination is evidently effected largely by lepidopterous insects, butterflies having been observed visiting the purpler flowers, and moths being no doubt attracted to whiter ones.

Variation.—*Phlox nivalis* is an exceedingly variable species, no two individuals seeming ever to be exactly alike. Its habit, while usually lax with tall flowering shoots, is occasionally dense with short ones, the plants then having the aspect of *P. subulata.* In most cases a whole colony will tend toward one or the other extreme, but in the midst of nearly every lax colony a few more or less dense variants appear, and dense colonies include some lax individuals. There is no recognizable geographic segregation of the contrasted types; both the tallest and shortest plants seen were in South Carolina, while the northwesternmost are up to the average in stature, showing no tendency to approach that of *P. subulata* where the ranges overlap.

This species can usually be distinguished from its relative by the presence of some leaves 3 mm. or more in width, yet in any large colony occasional plants, and in a few colonies the bulk of them, have leaves not exceeding 1 or 1.5 mm. wide. Tall lax plants frequently show the largest leaves, but exceptions to this correlation have been observed. The hairs of the inflorescence-foliage (upper leaves, bracts, pedicels, and calyces) are normally abundantly gland-tipped, and glandless hairs appear only as a rather rare mutation. The calyx-lobes vary in length from 2.5 to 4.5 mm.

That the flowers of *Phlox nivalis* are often pale in tint has been noted by several writers, the specimen on which the name was founded having represented a nearly white variant, but no data as to the actual variability in this respect have ever been published. Using color names and numbers according to Ridgway,[1] observations indicate the most frequent hue of the corolla-limb to be light phlox purple (65 d) or its slightly grayed equivalent, lilac (65′ d). The redder light mallow purple (67 d) is occasional; the bluer light amparo purple (63 d) or even light hortense violet (61 d) are exceptional. Deeper tones such as phlox purple (65 b) are decidedly rarer than in *P. subulata.* On the other hand, pale flowers are common, the limb being between a pink or pale purple of the "f" series and white; and complete albinos can be found in nearly every large colony. Many occurrences show this full range of color variation, but there is a tendency toward paleness in whole colonies here and there throughout the range.

The hue of the striae appears to bear little relation to that of the limb, being often slightly redder, although sometimes distinctly bluer. That most frequently seen is rhodamine purple (67), with a range to tyrian rose (69) on the one hand and to violet purple (63) or rarely even amethyst violet (61) on the other. The striae vary considerably in intensity, being occasionally faint in otherwise deeply colored flowers, or, on the other hand, strong in pale ones.

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[1] Color Standards and Nomenclature. 1912.

Variations also occur in corolla-dimensions, although it is noteworthy that on the average the corollas of this species are larger in all respects than are those of the other members of the section. The most significant feature here is the degree of development of the corolla-lobe sinus, which is used as a diagnostic character in the key to the species. In *Phlox nivalis* entire or merely slightly erose corolla-lobes are of frequent occurrence, and sinuses more than 1.5 mm. deep appear only in exceptional plants, 3 mm. having in fact been attained in but two out of 100 plants examined. The deeper sinuses, moreover, occur chiefly in cases where the lobes themselves are especially long, so that the sinus-depth rarely exceeds ⅙ the lobe-length.

The style varies somewhat in length in all colonies, although it has not been observed to reach the minimum value for the other two species of the section, this feature accordingly yielding the most constant and dependable key character for distinction from them. Some colonies have two (or three) ovules per cell in nearly every plant, but in many cases multiple ovules occur in only a few individuals.

This marked variability is presumably connected with the development of the species in too recent time, geologically speaking, for stability to have been attained. It could be given nomenclatorial recognition in part by rearranging into new combinations the technical names listed under history; a certain name would then represent, however, only an individual plant out of a colony in which there are scores of others equally deserving of names of the same rank. Thus, the original *P. nivalis* had dense habit, short corolla-lobes, and multiple ovules in the cells, while *P. hentzii* had lax habit, long corolla-lobes and single ovules. The second might be designated a form of the first, but the colony from which it came no doubt included other individuals with dense habit, long lobes, and single ovules; with lax habit, short lobes, and single ovules; with lax habit, long lobes, and multiple ovules, and so on. There being eight possible combinations for the extremes among the three characters mentioned, all of which may be expected to occur in a large colony of the species, seven additional form names would be required in this connection alone, and the recognition of median as well as extreme states would call for twice as many more. Moreover, if similar nomenclatorial treatment were to be extended to cover the rest of the variables already enumerated, and still others which might have been, the number of new names necessary would mount into the hundreds. As these variations all seem to be equally prominent throughout the range of the species, and to show no relation to any geographic, geologic, or ecologic factor, it is difficult to see how any useful purpose would be served by such an enormous series of technical names, so no attempt will be made to propose any. Should a genetic study of the species ever be undertaken—and in view of the striking variations exhibited in natural crossings, interesting results could be expected from experimentally controlled ones—the English descriptive terms here used, such as dense and lax habit, pale and deep color, long and short style, etc., would be preferable to any technical designations covering several variables, in referring to the plants obtained.

Cultivation.—Occurring in nature as it does only south of latitude 37°, *Phlox nivalis* is not entirely hardy in the northeastern United States, and little of it is in cultivation in this country. Certain of the plants sold as varieties of *P. subulata* appear, however, to be hybrids between the two species, as will be discussed in connection with the second. In England, on the other hand, *P. nivalis* has been in continuous cultivation since it was introduced by the collectors of the late 1700's, already mentioned. It is known there as *P. setacea,* the name erroneously applied to it by Curtis, and its horticultural value has been discussed, under this name, by Robinson.[1] The marked beauty of many of its color-forms suggests that attempts to develop hardier strains would be worthy of consideration on the part of American horticulturalists.

[1] English Flower Garden, ed. 13. 625. 1921.

2. **Phlox subulata** Linné. Moss Phlox. Plate 3.

History.—That this species was also collected in early colonial times is inferred from the inclusion of a figure apparently representing it in Plukenet's publication[1] of 1691, with the description "Lychnidaea Blattariae accedens Virginiana, Camphoratae congeneris glabris foliis, flore ad summitatem ramulorum singulari." In this case the drawing was made from a dried specimen, which is preserved in the Sloane herbarium in the British Museum, but there are no data as to where or by whom it was obtained. Occurrence of the flowers singly is not typical of the species, but is occasional in depauperate individuals, such as the one in question.

An interesting early reference to this *Phlox* is contained in a letter from John Bartram, the first native American botanist, that was later published by Darlington.[2] Writing to Gronovius, of Holland, under date of December 6, 1745, he told how, in areas underlain by what we now term serpentine rock, "The earth of each side is very black, and produceth a very odd, pretty kind of *Lychnis* [with which *Phlox* was often confused in pre-Linnean days] with leaves as narrow and short as our Red Cedar, of humble growth, perennial, and so early as to flower sometimes while the snow is on the ground."

The application of Linné's name *Phlox subulata*[3] to the present species is based on the existence of a specimen so labelled in his herbarium.[4] The sheet is initialed "K," signifying that it had been received from Kalm; the locality, as published, was "Virginia," but as Kalm did not travel south of Pennsylvania, it no doubt came from this state instead.

Linné cited Plukenet's figure of what is now termed *P. nivalis,* but that may be ignored as due to an error of interpretation of the figure. On the following page of the same work he listed a supposedly distinct species, under the name *P. setacea,* but no specimen of this is included in his

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[1] Phytographia pl. 98, fig. 3. 1691.

[2] Memorials of Bartram and Marshall 352. 1849.

[3] Species Plantarum (1): 152. 1753.

[4] Notes on this were kindly sent me by Mr. A. J. Wilmott of the British Museum, and a photograph of it was obtained by Dr. William R. Maxon of the U. S. National Museum in 1928.

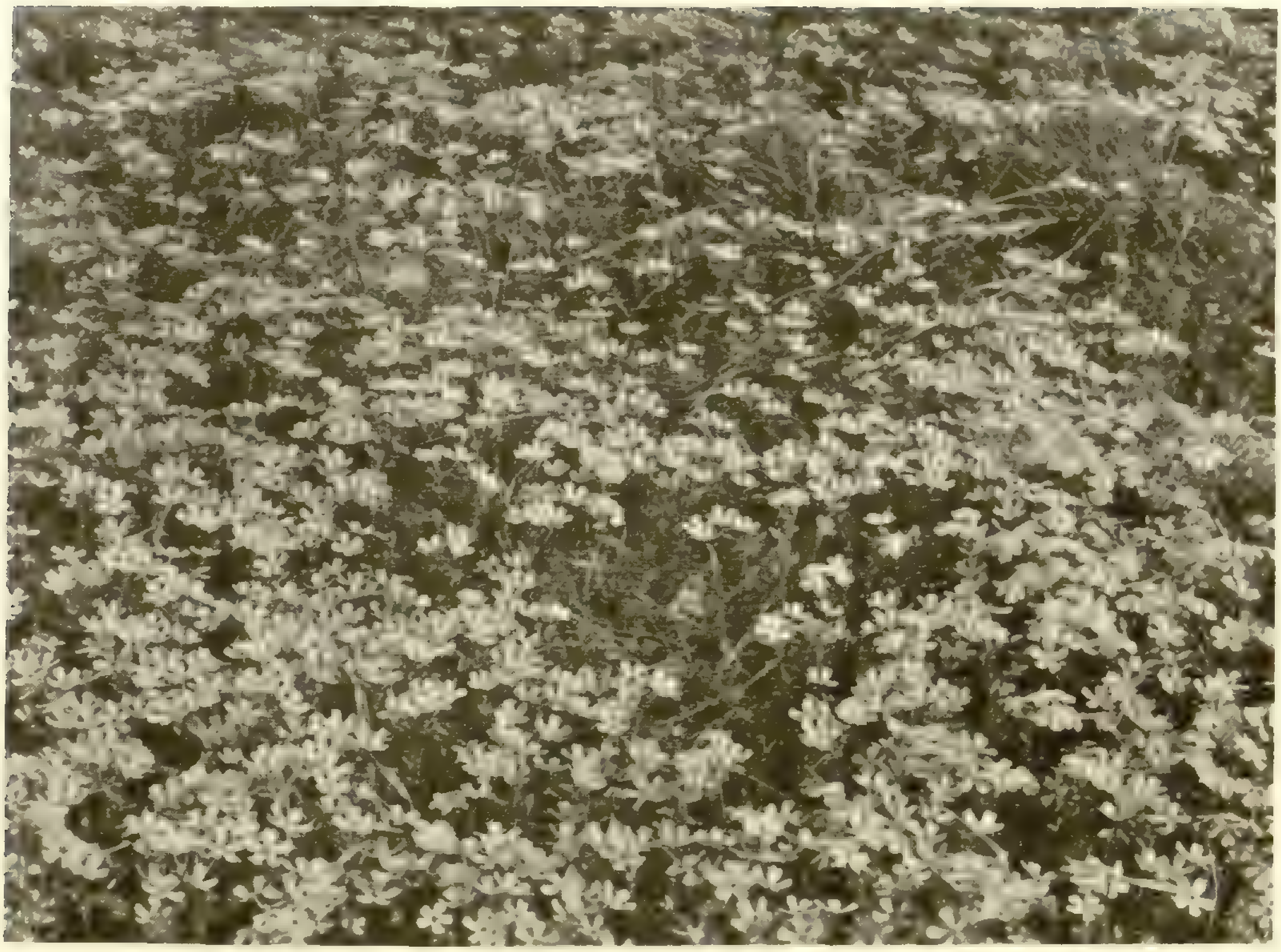

FIG. 1. *Phlox subulata*, Unionville, Pennsylvania.

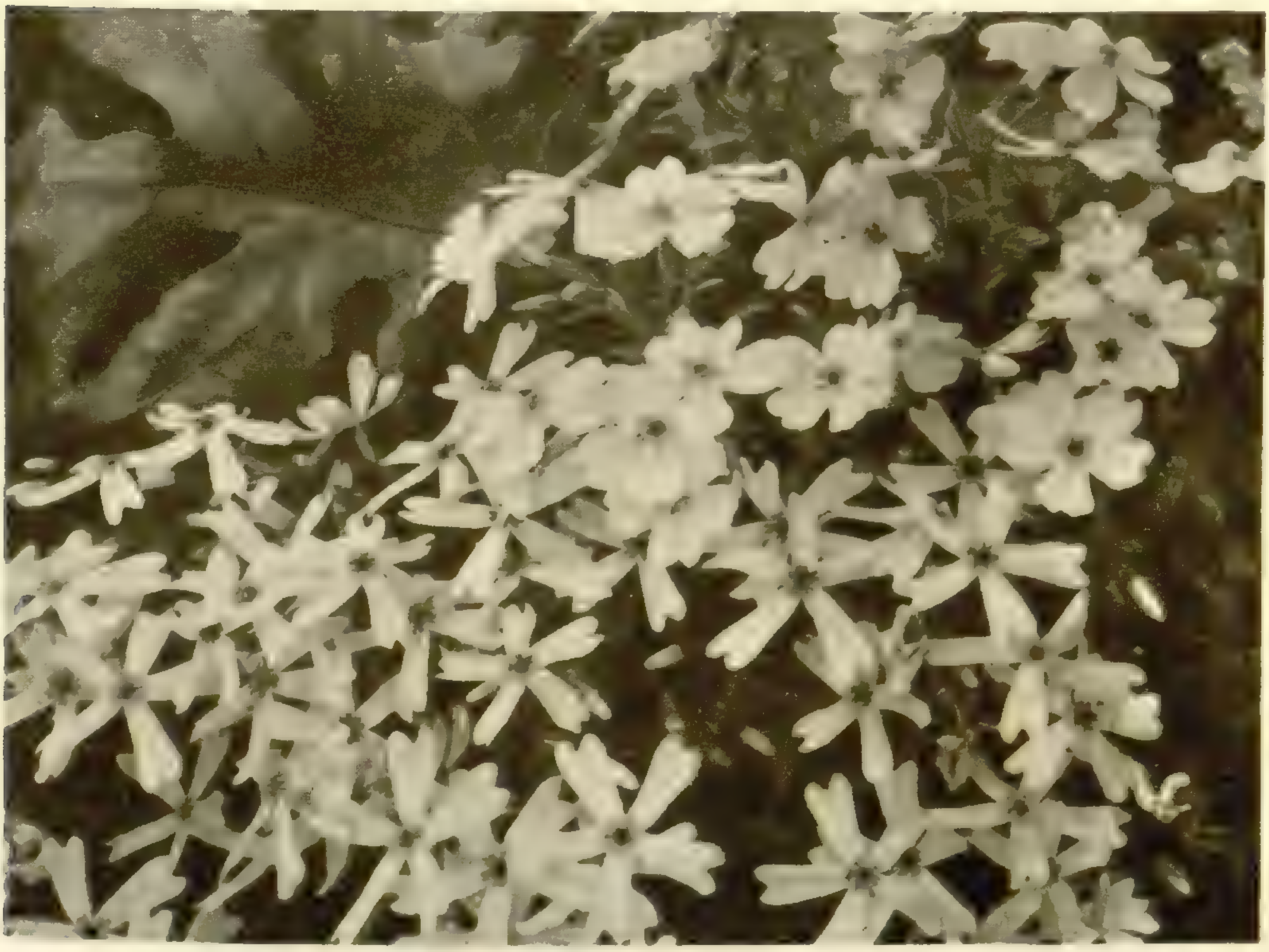

FIG. 2. *Phlox subulata,* Chew's Landing, New Jersey.

herbarium, the name being founded solely on Plukenet's figure, above mentioned. Since, however, that figure seems to represent merely a variant of *P. subulata,* the two must be combined, under the earlier name.

The first illustration of typical material of this species was that published by Curtis[1] in 1798; and many others have appeared since. The name *Phlox subulata* has long been in general use, although, as noted in the discussion, it has not infrequently been mistakenly extended to include the preceding species. For many years after Linné's day attempts were made to differentiate his *P. subulata* and *P. setacea*; in some cases the latter got applied to the plant here treated as *P. nivalis,* in others to variants of *P. subulata* exhibiting minor peculiarities. The climax of misinterpretation came in 1907, when Brand[2] endeavored to distinguish a *Phlox subulata eusubulata ciliata* with ciliate leaves from a *P. s. e. setacea* with glabrous ones. As the leaves of all of the members of this section are ciliate when immature and become glabrous with age, the distinction is hardly to be regarded as of taxonomic significance.

There remains to be considered the nomenclatorial treatment of white-flowered phases of *P. subulata.* The earliest publication which has been located, in which whiteness of corolla is made the basis for a special name, is one by Regel[3] in 1883, the horticultural term *P. subulata alba* being used. Subsequently, at intervals, *P. s.* forma *albiflora* Britton,[4] *P. brittonii* Small,[5] and *P. s.* forma *candidula* House[6] have been proposed. The first and last of these appear to refer to the same thing, namely albino mutants of ordinary *P. subulata,* for which Regel's name has priority. The middle one, however, differed also in having the hairs on the inflorescence gland-tipped as well as in other minor details, and deserves recognition as a distinct variety, as discussed below.

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[1] Bot. Mag. 12: pl. 411. 1798.

[2] In Engler's Pflanzenreich IV. 250: 78. 1907.

[3] Gartenflora 32: pl. 1107. 1883.

[4] Catalog Plants N. J. 175. 1889.

[5] Bull. Torr. Bot. Club 27: 279. 1900.

[6] Ann. List Ferns & Fl. Plts. N. Y. 581. 1924.

Geography.—Phlox subulata occurs in various physiographic provinces, though in the Coastal Plain only northward, from western North Carolina to southwestern Michigan and central New York; also, as an escape, from New York to eastern Maine. The data are presented on the map, fig. 2, on which dots indicate native colonies and ×'s introduced ones. This map bears two topographical boundaries and three other lines. The dotted one represents the terminal moraine of the last (Wisconsin) ice advance; colonies lying north of it can have been developed only in the 35,000 years or so since this ice sheet retreated. The distance of the most northwestern stations in Michigan from the presumable survival areas in Pennsylvania being about 350 miles (550 km.), the migration rate of the species across the Great Lake Lowland has averaged a mile per

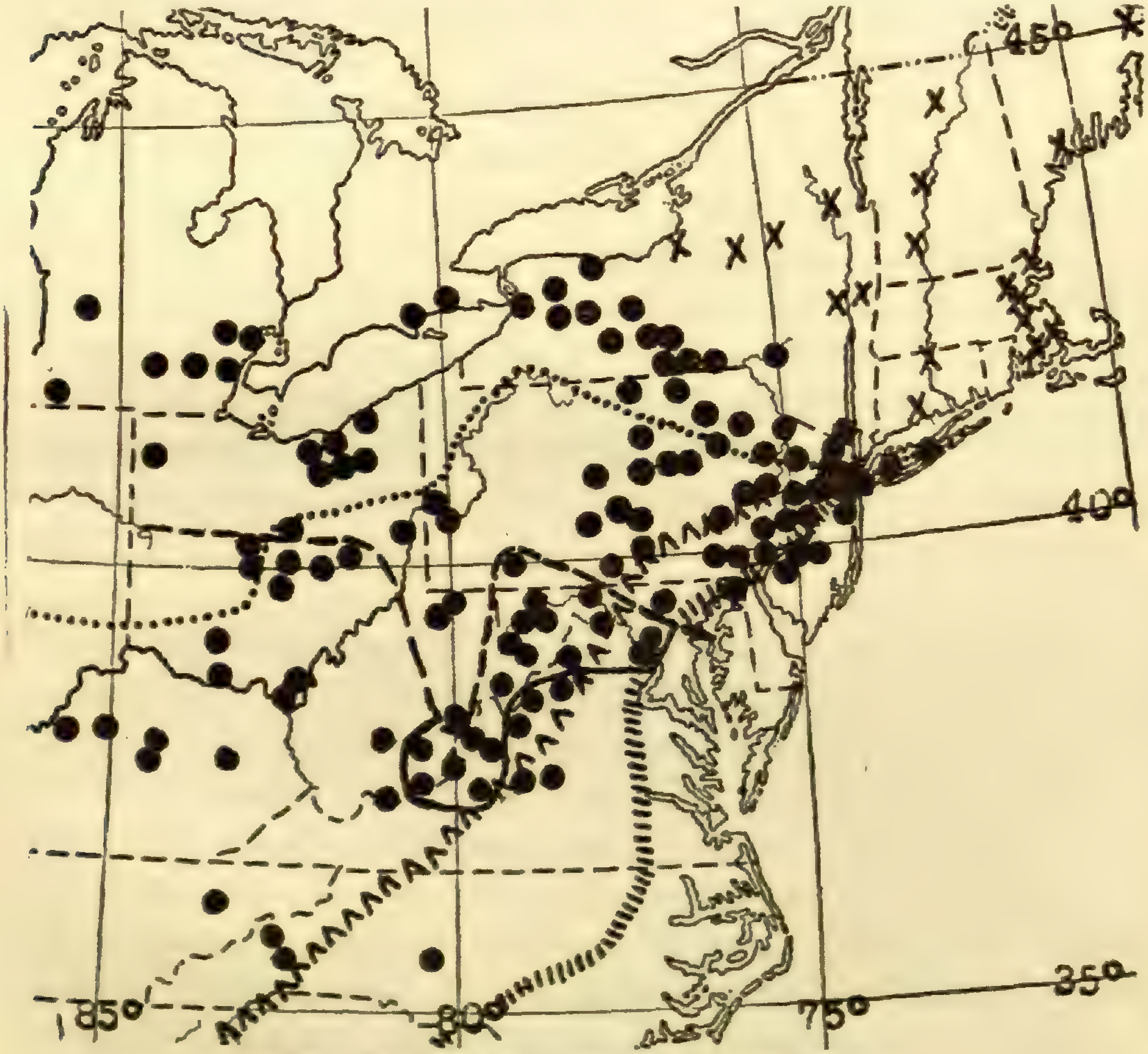

FIG. 2. Distribution of *Phlox subulata*.

hundred years. Northward and northeastward it has migrated more slowly, except where aided by man. There is no evidence of any change in characters associated with this occupancy of new territory. The dash line represents, as closely as available data permit, the boundary between a northern and two southern varieties of the species, the distinguishing characters of which are discussed under Variation. It shows no relation to any climatic, topographic, or geologic feature, as do most lines delimiting the ranges of northern and southern plants, there being, correspondingly, an association of the more austral varieties of this *Phlox* with boreal representatives of other plant groups in the southern mountains. The solid line surrounds the area occupied by the pale-colored southern variety, also cutting across topographic features in an unusual manner. No explanation can as yet be given for the curious courses of these boundaries, but further study of the matter is planned.

[ARKANSAS: Brand[1] cited Rafinesque, without reference, as authority for the occurrence of *P. subulata* here, but this plant does not appear to be mentioned in that author's writings, and as there are no specimens preserved from anywhere near the boundaries of the state in any herbarium examined, the record is considered erroneous.]

[CONNECTICUT: Recorded as an escape from cultivation in two counties, Hartford[e] and New Haven[e].]

[DISTRICT OF COLUMBIA: Although included in the Flora of the District,[2] this species is not actually native within its limits, the nearest known point which it reaches being Cropley, Montgomery County, Maryland, about 5 miles (8 km.) northwest of the boundary.]

KENTUCKY: Occasional in the eastern part of the state, specimens having been seen from Fayette, Jefferson, Jessamine, Morgan and Shelby counties.

[MAINE: Escaped in two counties, Cumberland[e] and Penobscot[e], the latter being the northernmost known occurrence of the species.]

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[1] In Engler's Pflanzenreich IV. 250: 77. 1907.

[2] Contr. U. S. Nat. Herb. 21: 235. 1919.

MARYLAND: Known only in Allegany′, Carroll, Cecil′, Montgomery′, and Washington′ counties. The line separating the ranges of the northern and one of the southern varieties of the species crosses the northern part of the state.

[MASSACHUSETTS: Specimens have been seen from six counties, all evidently representing escapes: Bristol″, Essex″, Middlesex″, Norfolk″, Plymouth″, and Suffolk″.]

MICHIGAN: Limited to the southern half of the lower peninsula, being recorded from Cass, Jackson, Kent, Macomb, Oakland, Washtenaw, and Wayne counties. The northwesternmost known locality for the species is one in Kent.

NEW JERSEY: Especially frequent and widespread in this state, occurring both in upland provinces and in the Coastal Plain north of the Pine-barrens. The counties in which it has been found are: Bergen, Burlington, Camden′, Essex, Gloucester, Hunterdon′, Mercer′, Middlesex′, Monmouth, Passaic′, Somerset, Union, and Warren.

NEW YORK: Occurs locally throughout the state south of the Adirondacks, although according to Dr. H. D. House the more northeastern records are based on escapes. The county list is: Albany″, Bronx Borough″, Broome, Chemung, Delaware, Erie, Genesee′, Herkimer″, Kings Borough, Livingston, Monroe, Nassau, Oneida″, Oswego″, Rensselaer″, Richmond Borough, Rockland, Schuyler, Steuben, Suffolk, Tioga, Tompkins′, Warren″, Wyoming, and Yates. The northernmost point at which it seems unquestionably native is Monroe county, the most eastern Suffolk county, on Long Island.

NORTH CAROLINA: Rare in the Blue Ridge and inner Piedmont and seen from but three counties, Buncombe, Madison′, and Rowan. The last of these is apparently the southernmost limit of the species; overlapping of the range with that of *P. nivalis* occurs here, but no tendency of the two to intergrade can be recognized.

OHIO: Scattered throughout except toward the southwest, the counties represented being: Adams, Cuyahoga, Defiance, Delaware′, Fairfield, Franklin′, Guernsey, Highland′, Jefferson, Knox, Lake, Lawrence, Licking′, Lorain, Medina, Muskingum, Portage, Scioto, and Summit. The line dividing the northern from one of the southern varieties runs slightly above the center of the state, corresponding, according to a private communication from Professor John H. Schaffner, to the boundary between the ranges of other northern and southern plants.

Ontario: Rare along the north shore of Lake Erie, occurrences in Haldimand and Norfolk districts being recorded by Macoun.[1]

Pennsylvania: Apparently more frequent here than in any other state, herbaria including specimens from 28 counties: Allegheny′, Beaver′, Berks′, Bradford, Bucks′, Center′, Chester′, Columbia, Cumberland, Delaware′, Franklin, Huntingdon, Juniata, Lackawanna, Lancaster′, Lehigh′, Luzerne, Lycoming′, Monroe, Montgomery′, Northampton, Northumberland′, Perry, Pike, Somerset, Tioga, Union, and Wyoming.

Tennessee: Included in the flora of the state by Gattinger[2] on the basis of its occurrence on Kates Mountain, West Virginia, but this is too remote from the boundary to be significant. Colonies have, however, been seen on shale hills at Leas Springs, Grainger′ county, and it no doubt occurs elsewhere toward the eastern end of the state.

[Vermont: Escapes are known in three counties: Caledonia″, Windham″, and Windsor″.]

Virginia: Recorded from Alleghany′, Amherst′, Augusta′, Bath′, Botetourt, Buckingham′, Fairfax′, Page′, Rockbridge′, Rockingham, and Shenandoah counties, both of the southern varieties being represented.

West Virginia: Common only in the eastern part, the county list being: Fayette, Grant′, Greenbrier′, Hampshire′, Hardy′, Jefferson′, Marion, Mercer′, Mineral, Monongalia, Monroe′, Pendleton′, and Pocahontas′. This appears to be the only state in which all three varieties are found; the evidence thus far obtained indicates that their ranges do not overlap, but more detailed observations along the boundaries are needed.

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[1] Cat. Canadian Plants 1: 328. 1883.

[2] Flora of Tenn. 140. 1901.

Ecology.—The characteristic habitat of *Phlox subulata* is a bare, sunny, slope, where the soil is sandy or gravelly, and rock ledges lie near the surface. Humus may be present in considerable amount, but is often lacking; moisture is usually very sparse. The reaction is decidedly variable, ranging from minimalkaline when, as is not infrequent, the substratum is calcareous, to subacid in non-calcareous areas. No definite optimum can accordingly be assigned to the species and it is seemingly to be regarded as essentially indifferent with respect to this factor. Growing in more sterile situations, and being still more compact and small-leaved than the preceding species, its classification as a xerophyte is even more justified.

From the successional standpoint, *Phlox subulata* is a pioneer plant, occupying areas of bare mineral soil, and producing humus through the accumulation and decomposition of its own leaves. In places where the sterility of its habitats is such as to discourage invasion by other plants, it often becomes dominant, and forms a temporary climax, as on the serpentine barrens of the Pennsylvania Piedmont, where many acres may be covered by nearly pure stands. When, on the other hand, the seeds of larger plants which fall into its soil are able to start extensive colonies, the *Phlox* rapidly dwindles and dies out. The fact that it escapes from cultivation so freely far northeast of its natural range suggests that the occupancy of new territory, which it began when the last ice-sheet retreated, is still under way.

The blooming period of this species extends through much of April and May, or in cooler localities into June. Additional flowers are frequently developed in the Fall, and sometimes even in Winter. Like the preceding species, it is protandrous, the stigmas ripening after the anthers; but it differs in having a long style, so that the stigmas lie well up toward the orifice of the corolla-tube. In occasional individuals, indeed, the stigmas are exserted, although as no change in anther position can be recognized in such cases, it is not to be classed as heterostylous. Butterflies are no doubt the chief agents of cross-pollination.

Variation.—While *Phlox subulata* resembles its relative, already discussed, in the extent of its variability, a new feature is now shown, namely, geographic segregation of extremes of certain of the variable characters.

As to habit, the majority of the colonies are of fairly tall and dense plants, with occasional lax-tall and a moderate number of dense-short individuals. There seems to be a definite tendency, however, for dense-short plants to become dominant at the higher elevations, especially in the southern Blue Ridge and Appalachians. The more low-growing plants usually have the shorter leaves, the greatest leaf-length in the regions just mentioned being around 10 mm., whereas a range up to 20 mm. is shown elsewhere. Leaf-width, on the whole, varies inversely with length, although relatively long leaves may widen wherever the plants are shaded. The calyx-lobes vary to about the same extent as do those in *Phlox nivalis,* but without evident correlation with other features.

The situation with respect to glandularity has apparently never been understood heretofore. Segregation in this feature follows latitude instead of altitude, southern colonies having dominantly glandular, and northern ones non-glandular inflorescence-foliage. The boundary between the two types has been discussed in connection with figure 2, page 20; north of this line glandular hairs appear on two or three per cent. of the plants, while south of it nearly every plant is glandular, glandless forms being extremely rare, though not unknown.

An account of the variability of *Phlox subulata* in corolla-color has already been published by Stout,[1] on the basis of observations at a few northeastern localities; the extension of similar observations over a much wider area has led to the recognition of the following relations for the species as a whole: The commonest colors are light amparo, phlox, and mallow purples (63, 65, and 67 d), although the corresponding deeper tones (b series) are more frequent than in the preceding species, and a few instances of full colors (Ridgway's unlettered series) have even been noted. On the other hand, paler tints (f series) are prominent in some colonies, extending on the red side to pale amaranth pink (69 f), and on the blue side even further, to pale hortense violet (61 f). Complete albino mutants occur here and there throughout the range. In many areas, especially those in the Pennsylvania Piedmont, the whole series of color variation is shown, but there is at times a tendency toward deepness or paleness in separate colonies. Particularly notable is the presence in the southern Appalachians of entire colonies in which the corolla-color is never deeper than the "d" series, and tends toward a pale violet or lavender rather than the usual purple hue.

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[1] Journ. N. Y. Bot. Garden 18: 75. 1917.

As in the preceding species, the color of the striae does not necessarily follow that of the corolla-limb, although hues approaching violet (59) are much commoner in the Appalachian region than elsewhere, in correlation with the tendency of the color as a whole.

The dimensions of the corolla-parts show about as much variability as in *Phlox nivalis,* but with the difference that entire lobes are much rarer than in that species, although they do occur on a small percentage of the individuals in every large colony. Here, too, tabulation of the measurements on more than a hundred plants, on a geographic basis, has brought out the fact that the corolla averages smallest in the Appalachians, and largest elsewhere in the south (see opposite page).

That the style of *Phlox subulata* is variable in length was mentioned under Ecology. Here no geographic segregation can be recognized, one or two per cent. of plants with exserted stigmas appearing in colonies throughout the range, and variants showing different degrees of shortness occurring intimately admixed. The style never becomes so short as to resemble that of *P. nivalis,* however, even where the species overlap, this furnishing one of the arguments for the distinctness of the two.

Many of these variations occur, as in the preceding species, in such close association that any system of technical nomenclature covering their inter-relationships would be too cumbersome for practical use. Certain of them which exhibit definite geographic segregation deserve, however, nomenclatorial recognition. Since Brand's polynomials, elaborate as they are, do not really correspond to the existing relations, a new system of nomenclature is called for. In this, the three distinguishable varieties will be designated by trinomials, but in order that the plan shall not become too unwieldy, the noteworthy forms will be referred to only by English adjectives. In the following tabulation the varieties are placed in the relative positions in which they occur in nature:

VARIETIES AND FORMS OF PHLOX SUBULATA

INFLORESCENCE-HAIRS NORMALLY GLANDLESS AND COROLLA PURPLE, ITS TUBE AVERAGING 11 MM. LONG, LOBES 8 x 5.5 MM., AND SINUS 1 MM. DEEP.

Phlox subulata ciliata (Brand) Wherry, comb. nov. *P. s.* subsp. *eusubulata* var. *ciliata* Brand. The original Linnean specimen on which the species was founded represented this variety.

Forms:

Glandular. Typified by specimen from serpentine barrens 1½ miles northeast of Unionville, Chester Co., Pa., collected by E. T. W. May 9, 1926; occurs occasionally throughout the area of the variety.

White (albino). *P. s. alba* Regel, *P. s.* f. *albiflora* Britton, *P. s.* f. *candidula* House. A mutant, also occasional throughout.

INFLORESCENCE-HAIRS NORMALLY GLAND-TIPPED.

COROLLA NORMALLY DEEP PURPLE; TUBE 12.5, LOBES 9 x 6, SINUS 1.5 MM.

Phlox subulata australis Wherry, var. nov. Named from its geographic position. Typified by specimen from limestone ledges 7 miles northeast of Staunton, Augusta Co., Va., collected by E. T. W. April 9, 1928; widespread in the south.

Form:

Glandless. Typified by specimen in Gray Herbarium from Salisbury, Rowan Co., N. C., collected by A. Ruth, April 15, 1900 (upper plant); apparently exceedingly rare.

COROLLA NORMALLY LAVENDER-WHITE; TUBE 11, LOBES 7 x 4.5, SINUS 1.5 MM.

Phlox subulata brittonii (Small) Wherry, comb. nov. *P. brittonii* Small. *P. s.* subsp. *nivalis* Brand as to definition but not as to citations: not *P. nivalis* Lodd.; occupies a restricted area in the Appalachians and Potomac Valley.

Form:

Glandless. Typified by specimen from shaly slope 2 miles northeast of Cumberland, Allegany Co., Md., collected by E. T. W. May 27, 1928; occurs sparingly in a few colonies.

In considering this table it must be borne in mind that individual plants within colonies of one variety may simulate either of the others. For example, a plant of the glandular form of *P. s. ciliata* which chances to have especially large corollas might pass as *P. s. australis*. The characters tabulated are only dominant or average ones, and can scarcely be safely applied for identifying isolated specimens.

Cultivation.—The late Reginald Farrer[1] aptly expressed the significance of this *Phlox* when he wrote that "The day that saw the introduction, more than a century since, of *Ph. subulata,* ought indeed be kept as a horticultural festival." The earliest record of its introduction is contained in a letter from John Bartram to Peter Collinson, dated December 10, 1745, published by Darlington,[2] in which the shipment of "one sod of the fine creeping spring *Lychnis*" was announced. This was listed by Collinson, as recorded by Dillwyn,[3] under the name "Lychnidea sempervirens, flore rubro." From that time on *P. subulata* has been repeatedly referred to in horticultural writings, and has yielded under cultivation numerous forms, a few of which may be briefly discussed here.

Under the name *Phlox subulata* "vivid" Hort. two different types are sold; one is a bright-colored and luxuriant variant of the species itself, the other an obvious intermediate between *P. subulata* and *P. nivalis,* presumably representing a hybrid between them. The latter exhibits corolla-lobe sinuses 0.5 mm. deep, uppermost anther 1 mm. below the corolla-tube orifice, style 3.5 mm. long, and ovules double in some cells. Its corolla-color, which lies near tyrian pink (69 b), is rather redder than that of either species in the wild, and probably arose in connection with the hybridization.

One plant variously offered in the trade as *P. subulata* "lilacina" Hort., *P. s.* "stellaria" Hort., *P. s.* "G. F. Wilson" Hort., etc., lies similarly intermediate in leaf-size, corolla-color, and sinus-depth between this species and *P. bifida,* the one next discussed, and may well be a hybrid between this pair. The same varietal names are often applied, however, to what appear to be merely lilac-colored forms of typical *P. subulata.* Such use of several names for the same plant, and single names for two or more different plants, has given rise to many contradictory statements in the literature, so that there is need for further study of all the horticultural varieties.

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[1] English Rock Garden 2: 67. 1919.

[2] Memorials Bartram and Marshall 173. 1849.

[3] Hortus Collinsonianus 39. 1843.

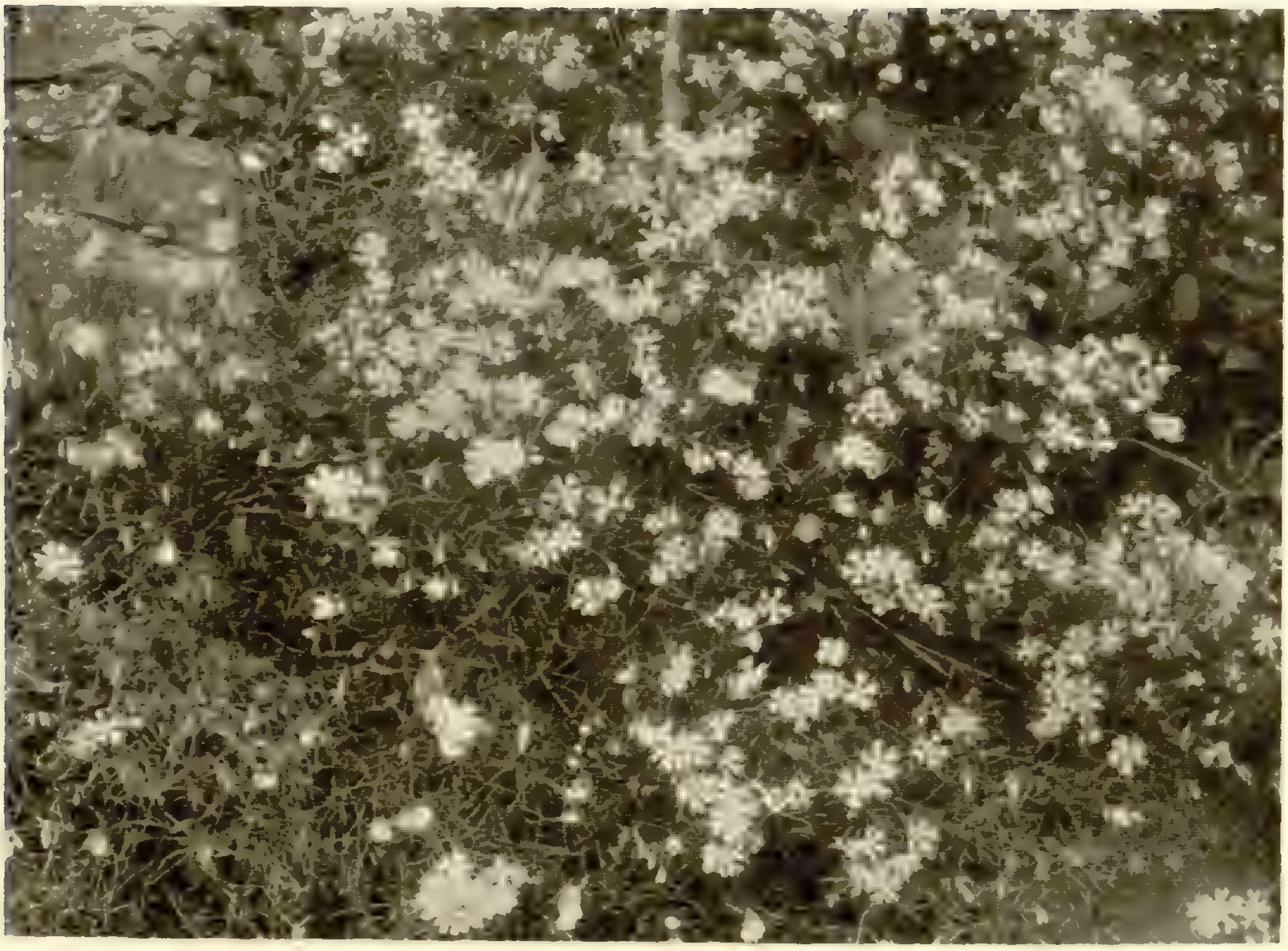

FIG. 1. *Phlox bifida*, Grand Tower, Illinois.

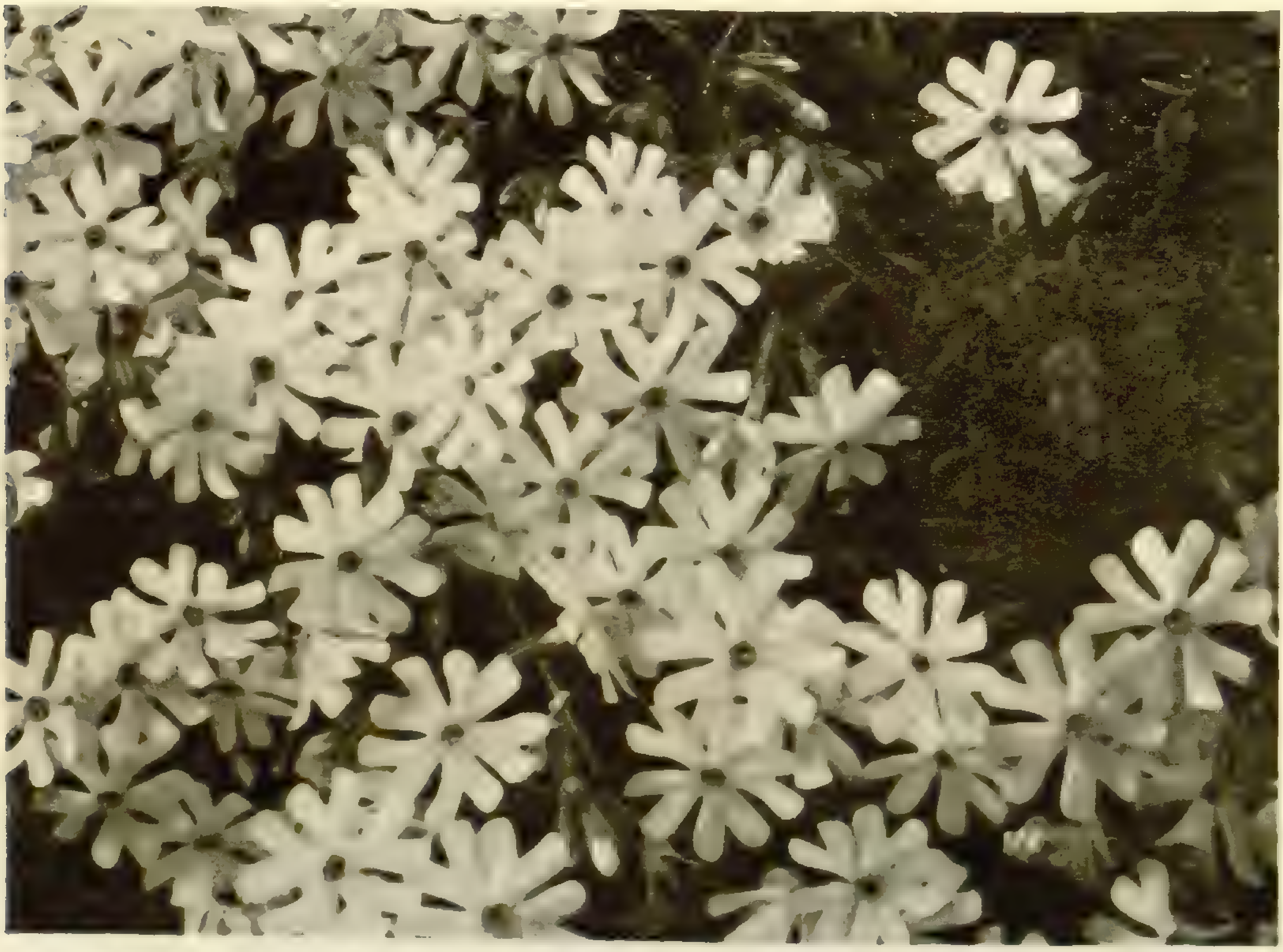

FIG. 2. *Phlox bifida*, in cultivation; originally from Tremont, Indiana.

3. **Phlox bifida** Beck. SAND PHLOX. Plate 4.

History.—Growing as it does only west of the Allegheny mountains, this species did not become known to the botanists of the 1700's, but was discovered by Beck[1] in Illinois during 1820 or 1821, and described by him as *Phlox bifida.* It was also found about the same time by Short,[2] but for some obscure reason he questioned its distinctness; quoting the description of *P. setacea* (now referred to *P. nivalis*) given by Curtis,[3] he remarked, "I have ventured with doubt to affix this name to the present species although it agrees nearer with the description given above than any other specific character to which I have access and I can scarcely suppose it a new species." The name *setacea* has thus, curiously enough, been applied at one time or another to all three members of this section, yet is regarded as inacceptable for any of them.

That Gray proposed another name, *Phlox stellaria,* for material collected by Short, was noted in the account of the way my interest in the *Polemoniaceae* was aroused. As his type specimen was, however, not even typical of the locality where it occurred, this can not be accepted as a species; its status will be discussed under Variation. Brand's[4] supposed variety, *P. stellaria cedaria,* is still less acceptable, being based on a specimen from which mature leaves had evidently been broken off. The name *stellaria* has appealed to compilers of local floras, as well as to horticulturalists, more than *bifida,* but the rule of priority requires adherence to Beck's name for the species.

Geography.—Phlox bifida ranges through the Interior Low Plateaus, Ozark Plateaus, and Central Lowland provinces, from northern Tennessee to southeastern Kansas, eastern Iowa, and southwestern Michigan. The map, fig. 3 (following page), bears a dot for each county, a solid line delimiting the two varieties, and a dotted line marking the terminal moraine of the Wisconsin ice-sheet.

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[1] Amer. Jour. Sci. 11: 170. 1826.

[2] Transylv. Journ. Med. 2: 441. 1829.

[3] Bot. Mag. 12: pl. 415. 1798.

[4] In Engler's Pflanzenreich IV. 250: 75. 1907.

Some of the gaps between close groups of dots are probably due to lack of collecting. For example, the existence of ten county records on the Indiana side, and but two on the Illinois side of the boundary between these states, evidently reflects the activity of Mr. Charles C. Deam in the former. All the dotless areas can not be so explained, however, and this species undoubtedly tends toward a more scattered type of distribution than its relatives. It agrees with *P. subulata*, on the other hand, in showing no evident morphologic change connected with crossing the moraine or occupying the glaciated territory. In post-glacial time it has advanced about 175 miles (275 km.), so its average migration rate is but a mile per 200 years.

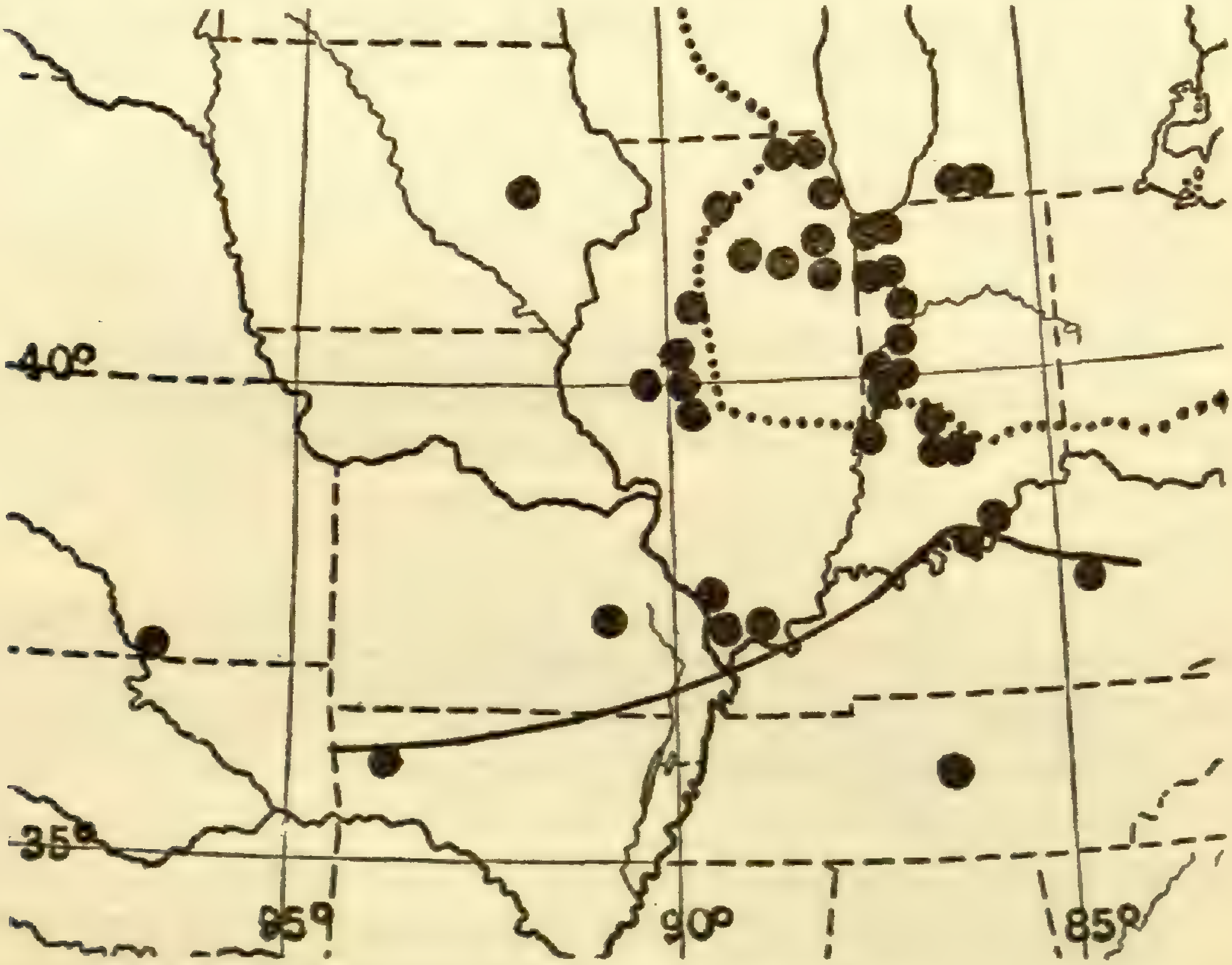

FIG. 3. Distribution of *Phlox bifida.*

ARKANSAS: Recorded from a single locality in the Ozark Plateau province, in the ravine of War Eagle Creek near Huntsville, Madison′ County.

ILLINOIS: Apparently most widespread in this state, being recorded in at least 16 counties: Cass, Cook, Grundy, Jackson′, Johnson, Kankakee, Lake, La Salle, Lee, McHenry, Mason, Menard, Peoria′, Sangamon, Union′, and Will. Its northernmost known occurrence is that in Lake county.

INDIANA: Scattered through the western and south-central parts of the state, as shown especially by the collections made by Charles C. Deam, preserved in his private herbarium at Bluffton. The county list is: Brown, Clark, Fountain, Harrison, Jasper, Lake, Monroe′, Montgomery, Morgan, Newton, Parke, Porter′, Tippecanoe, Vigo, and White. The southernmost occurrence, in Harrison county, possesses differences justifying nomenclatorial recognition.

IOWA: The single locality, Vinton, Benton county, is the northwesternmost point the species is known to reach.

KANSAS: A specimen is preserved at the New York Botanical Garden from Cowley county, in the southeastern part of the state. This locality apparently represents a remote western outlier, no other of the same variety having been discovered within 325 miles (525 km.) of it.

KENTUCKY: Here again but one locality is known, on cliffs near the junction of Hickman Creek and the Kentucky River, at Camp Nelson, Jessamine′ county. That this was the type locality of "*Phlox stellaria,*" unknown to Gray at the time he proposed that name, is shown by the presence in several herbaria of specimens collected here by Short.

MICHIGAN: Reported from two counties, Cass and St. Joseph, the latter being the northeastern limit of the species.

MISSOURI: Apparently very rare, specimens having been seen only from Iron county, in the southeastern Ozarks.

TENNESSEE: Recorded (as *P. stellaria*) by Gattinger[1] from Lavergne, Rutherford′ county, and distributed by him to numerous herbaria from this place. The colony lies about 1 mile northeast of the village, and was found in 1929 to be still in existence, although damaged by grazing. Reports from Nashville, Davidson county, probably refer to the same, as Gattinger wrote on some of his labels "Lavergne near Nashville." Through some misunderstanding, Curtiss distributed material obtained from Gattinger, no doubt from the same locality, with printed labels reading "Cedar barrens, Tullahoma," and this has given rise to reports that the plant also occurs in Coffee (sometimes mis-stated as Crawford) county. In his Flora, however, Gattinger had pointed out the marked contrasts between the cedar barrens, such as those at Lavergne, with the oak barrens around Tullahoma, and there is not the slightest evidence that the *Phlox* ever occurred in the latter region.

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[1] Flora of Tenn. 140. 1901.

Ecology.—Like the other members of the section, *Phlox bifida* is an occupant of relatively sterile sandy or rocky soil. It is found chiefly on bare cliffs, where it often forms great festoons, and on sandy banks and dunes. It appears to thrive equally well on calcareous substrata, where the reaction of the soil around its roots is minimalkaline, and on humus-rich soils where subacidity is reached, so is regarded as indifferent. The leaves of this species are larger than those of the others, but at the same time fewer in number, so that it is to be classed as similarly xerophytic. In the manuals it is usually separated from the others on the basis of being supposedly deciduous while they are evergreen; the proportion of younger leaves which are fully evergreen to older ones which are marcescent is essentially the same in all three, however, and the misunderstanding is evidently due to the sparseness of the leaf-bearing nodes in the present species.

In successional relationship *Phlox bifida*, like *P. subulata*, is a pioneer, colonizing bare mineral soil, and holding the surface until humus accumulates. It even occupies slowly moving sand dunes around the southern end of Lake Michigan, aiding in keeping them from more rapid migration. It is, however, quite intolerant of competition or shading, and soon dies out as later vegetational stages develop. That it may have reached a climatic barrier at the northern end of its range is suggested by the fact that, before man interfered, it was exceedingly abundant in Cook County, Illinois, being represented in herbaria from at least 15 different stations; yet in Lake County, which lies next on the north, it is recorded from but a single small colony near Waukegan, and proved to be quite absent when sought, in seemingly favorable situations, over several square miles of undisturbed territory there. The easternmost known occurrence in Jessamine County, Kentucky, is very luxuriant, but the plant has been unable to colonize similar cliffs farther east.

The latter part of April and early part of May is the time of maximum bloom of this species, although the whole range is from early April well into June. Sporadic Fall flowers appear to be much rarer than in its relatives. The average style-length is intermediate between that of the other two, so that the stigmas lie in the midst of the anthers; protandry again prevents self-pollination, however, and crossing is presumably effected by moths.

Variation.—Phlox bifida varies rather less than the other members of the section, being essentially uniform in habit and leaf-characters throughout. In certain inflorescence-features, however, it is sufficiently variable to call for detailed discussion.

In the northern part of the area occupied by this species, the hairs on the younger growth are usually abundantly gland-tipped; toward the center, glands are fewer, and may be present only along the pedicels. This tendency toward diminution of glandularity reaches its maximum in the more southeasterly colonies, where no glands have been observed at all, and where, moreover, a small percentage of the plants have glabrous inflorescence-foliage.

The present species is more constant in corolla-color than are most other Phloxes. The normal hue is pallid violet (59 f), ranging through imperceptible gradations to white with violet tube, the latter coloration being especially well developed in northeastern Illinois. Eye-striae are often absent or faint, but occasionally a plant is found which has strong ones of a violet color, even blue-violet (55) having been observed. No tendency of the coloration to vary toward the red-purples characterizing the other two members of the section appears to exist.

In corolla dimensions *Phlox bifida* is less uniform. Some colonies, especially toward the southern part of the range, have corolla-lobe sinuses varying from 2 to 3 or at most 4 mm. in depth, while farther north the range is from 2 to 5 or even 6 mm. deep. The segments show considerable variation in outline, from narrow to wide and acute to obtuse, without correlation with sinus-depth. In style-length it is intermediate between its two relatives, a range of 4 to 11 mm. having been observed, with 7 mm. most frequent. Multiple ovules have been noted but once among a hundred plants.

Adopting the same plan as with the preceding species, the varieties which exhibit sufficient geographic segregation to deserve nomenclatorial treatment are as follows:

VARIETIES AND FORMS OF PHLOX BIFIDA

YOUNG GROWTH PUBESCENT, ALL THE HAIRS OFTEN GLAND-TIPPED.

Phlox bifida glandifera Wherry, nom. nov. *P. bifida* Beck, renamed as a variety in reference to its most distinctive feature; widespread.

Forms:

Pubescent but glandless. Typified by specimen in U. S. National Herbarium from Klinger Lake, St. Joseph Co., Mich., collected by C. F. Wheeler June 6, 1890; very rare, known only from this locality.

Puberulent, glandular-pedicelled. Typified by specimen from Fountain Bluff, Jackson County, Ill., collected by E. T. W. April 21, 1928; rare, and forming a transition to the second variety.

YOUNG GROWTH THINLY PUBESCENT WITH GLANDLESS HAIRS, TO GLABROUS.

Phlox bifida stellaria (Gray) Wherry, comb. nov. *P. stellaria* Gray, here redefined to cover all the material present at its localities. Typified by a specimen collected at Camp Nelson, Jessamine Co., Ky., by E. T. W. April 11, 1928. Known at one station each in Ark., Ind., Ky., and Tenn. The form on which Gray founded *P. stellaria* was:

Glabrous. Rare, in Ky. and Tenn., in the midst of the normal form.

Cultivation.—In spite of the attractive aspect of most of its variants, *Phlox bifida* has not been cultivated to any considerable extent. Material offered by dealers under the name *P. stellaria* does not agree with the native plant to which that name was applied, but seems, like the so-called *P. subulata* "G. F. Wilson" Hort., to represent a hybrid between *P. subulata* and *P. bifida*. This species and its hybrids deserve more attention from horticulturalists.

RELATIONS IN THE SECTION SUBULATAE

The areas occupied by the three species of this section and their varieties are plotted diagrammatically in figure 4, and the trends of certain of their characters indicated by marginal arrows. Glandularity increases northward in *P. bifida* and southward in *P. subulata,* so lacks geographic significance; but deepening of corolla-lobe sinuses and lengthening of style are accentuated northward, and darkening of corolla-color eastward as well. The last three being regarded as evolutionary advances, the inference may be drawn that the ancestors of these species migrated into this region from farther south and west, no doubt during one of the interglacial stages of the Glacial epoch. Species of similar aspect, though retaining the primitive character of isolated flowers, are actually widespread in the southern Rocky Mountains, and that region is probably to be regarded as the ancestral home of the section Subulatae.

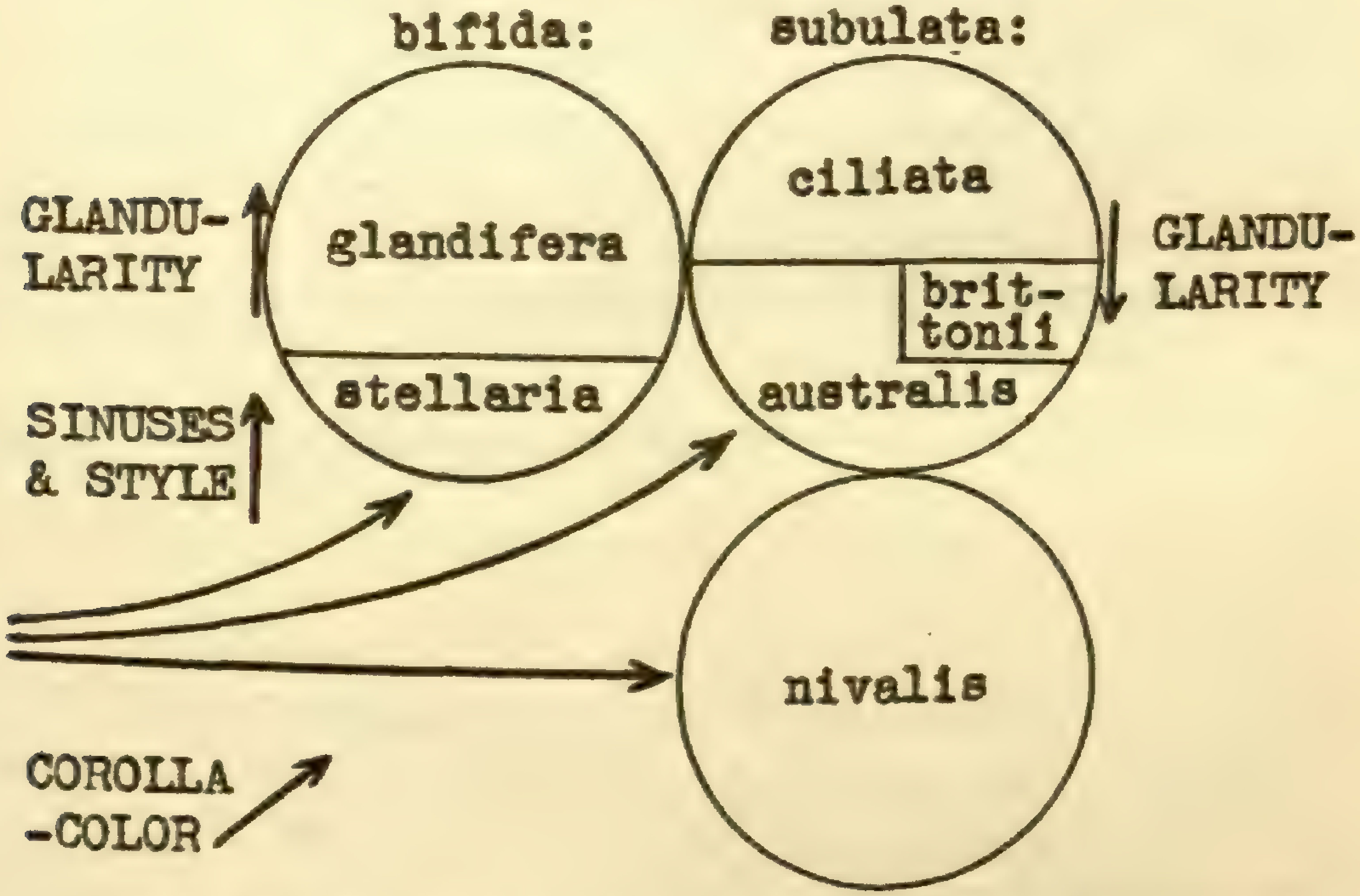
bifida:
subulata:
GLANDU-LARITY
glandifera
stellaria
ciliata
brit-tonii
australis
GLANDU-LARITY
SINUSES & STYLE
nivalis
COROLLA -COLOR

FIG. 4. Morphology in relation to geography in the Subulatae.

A Centennial Survey of the Chester County Flora

HUGH E. STONE

On hundred and three years ago Dr. William Darlington published a catalogue of flowering plants of the vicinity of West Chester, Pennsylvania, under the name of "Florula Cestrica." This book of 150 pages, with its old style type and hand-colored illustrations, is a rare and interesting volume. It was elaborately dedicated after the manner of the day, first to Rev. Lewis D. von Schweinitz, of Bethlehem, Pennsylvania, and again to the memory of Dr. William Baldwin, of Wilmington, Delaware, and was primarily a check-list of the wild plants found in Chester County by the author. In addition to the scientific name of the plant, for each species was given an English name, a line of description, habitat, color, and months of flowering and fruiting. Appended was a similar list of plants commonly cultivated in the vicinity of West Chester.

Eleven years later, in 1837, Dr. Darlington published his "Flora Cestrica" in which was incorporated all of the information of the earlier work and which considered the "flowering and filicoid plants" of all Chester County. Both of these books followed the old Linnean sexual system of classification but when in 1853 Darlington brought out his "Flora Cestrica, Third Edition" he adopted the system in use today and grouped the plants under natural families. Apparently there never was a proper second edition issued. When preparing the final work the author evidently had in mind all his three books, the diminutive "Florula" and the two "Floras," as in this last publication he constantly refers to the earlier "Flora" as "Edition Two." It would seem appropriate to follow him in referring to the "Florula Cestrica" of 1826 as "F. C. 1," the "Flora Cestrica" of 1837 as "F. C. 2" and the "Flora Cestrica" of 1853 as "F. C. 3."

The Flora of 1837 is a remarkably able work and in many ways a much more satisfactory local botany than the later one. Its plant descriptions are full and accurate and were either original or were compiled from contemporary authorities with discriminating care. Synonyms and references were fully set forth. Popular names, time of flowering and fruiting, local habitat, color notes, medical and economic properties, all were carefully recorded. The author had availed himself of the best botanical works of his time as is evidenced by the many quotations.

In studying this book one is conscious of the fact that Dr. Darlington considered quite a few of his species susceptible of further analysis and subdivision. His treatment of *Eupatorium, Viola, Geum, Cerastium* and many other genera clearly indicates this. In handling closely related groups the author showed considerable independence in assigning specific rank to plants which had been recognized by certain early botanists. Unfortunately he seems later to have fallen under the consolidating influence of Dr. Gray and his third edition dropped 26 species most of which have since been considered sound. Some of these were given up reluctantly as, for example, under his foot-note to *Viola cucullata* (F. C. 3), "The *Viola sororia* Wlld. and Flora Cestrica, Ed. 2, is made a variety of this by Torrey and Gray and a very distinct one I think it is." But in no instance do we find any vigorous protest against the decisions of the above authorities. Under *Senecio aureus* he said "Torrey and Gray have reduced two of Muhlenberg's species to the grade of varieties, which may be well enough, whenever practicable, in a genus that comprises 600 species." Considering the fact that locally we have but three or four species of *Senecio* the reason for refusing a place to *S. balsamitae* seems without much point and scarcely scientific. One wonders what the doctor would have thought of the modern treatment of the genus *Crataegus*. It is to be regretted that Darlington's evident modesty did not permit him to develop and work out the ideas outlined in the earlier Flora and to publish his own conclusions in his third edition without the subservience to the opinions of later botanists which is so evident.

The "Flora" of 1853 was intended to be, as the title states, "An Herborizing Companion for the Young Botanists of Chester County." It attempted to embody all the data of the earlier works in a condensed form and included about forty more species which had been found in the county during the sixteen-year interval. It also described 132 species of cultivated field and garden plants, and included mosses, lichens and hepaticae as well as copious notes.

From a strictly scientific standpoint the book lost considerable force and interest through the too drastic condensation. Its outstanding feature was the introduction of the foot-notes.

A charming little dissertation followed the description of nearly every species. To quote a few at random, under *Salix alba*, "We are told that the yellow willow, in this state, came originally from some wicker work found sprouting in Dock Creek, Philadelphia. It was seen by Dr. Franklin, who took it out and gave the cuttings to Charles Norris, who reared them on the grounds now the site of the Custom House." Under *Verbascum blattaria* we read, "The variety with whitish, purple tinged flowers has become a common weed in Chester County, the other is more rare. It appears by the Bartram Correspondence that about the year 1735 Peter Collinson sent the seeds of the yellow moth mullen to John Bartram as a curiosity and that is no doubt the way the yellow variety came to be so common around Philadelphia." Under *Mentha viridis* he said, "This pleasant aromatic herb is extensively naturalized and is valuable as a domestic medicine in relieving nausea, etc. It is the species employed in the preparation of that seductive beverage known as the Mint Julep of old Virginia, in which its value is more equivocal." Corporal punishment appears to have been on the wane for under *Betula nigra* he wrote, "The flexible twigs of this species, instead of being used to regulate and stimulate lazy and unruly boys, are now chiefly employed in the manufacture of brooms for sweeping streets and stable yards in our cities."

Such attractive notes enlivened almost every page. Curious popular beliefs regarding the curative properties of various plants were commented upon, usually with amused tolerance. Opinions on the economic value of grasses and fruits, the desirability of certain native plants in gardens, the danger from pernicious introductions—hundreds of interesting facts and opinions make the book a valuable and delightful addition to the library of every flower lover.

A few of Darlington's rare native plants do not appear to have been recorded from the county since his time. Were it not for his merited standing as a botanist and for the surprising things which we all turn up now and then, one would be inclined to doubt some of his records.

Carex aestivalis and *C. collinsii, Geum rivale, Scutellaria galericulata* and *Lippia nodiflora* would, any one of them, be worth a day's journey to find and a red-letter day it would be. Probably most of his indigenous species still persist. Such plants as *Arethusa, Calopogon, Oxycoccus, Rynchospora alba* and *Phragmites* appear to have become extinct through the draining of swamps and more thorough farming methods, but one never can tell what some fence corner may harbor!

In a summary on page 459 (F. C. 3) Darlington gave a list of 157 species which he stated were naturalized in Chester County and which he included as established species in his flora.

In this list were:

Delphinium consolida
Argemone mexicana
Fumaria officinalis
Bupleurum rotundifolium
Helianthus annuus
Artemisia vulgaris
Filago germanica
Senecio vulgaris
Centaurea cyanus
Veronica hederaefolia
Origanum vulgare
Thymus serpyllum
Marrubium vulgare
Lamium purpureum
Chenopodium hybridum
Amaranthus spinosus

None of these plants, so far as I can find, appear in published lists or public collections made in the county since Darlington's time. Most of them were probably waifs which have not persisted or which have not spread to any extent. He also included *Acorus calamus* as an introduction, accrediting it to

India and stating in a foot-note, "Our American botanists speak of it as being undoubtedly indigenous but I have never seen it where it did not appear like an introduced plant."

Probably the greatest change in the flora of Chester County since 1853 has come about through the invasion of the weeds. A great many field and wayside plants are conspicuously abundant today which were locally unknown then. *Asparagus* had not strayed to the roadsides, *Lychnis alba, Dianthus armeria, Trifolium hybridum* and *Lysimachia nummularia* had not appeared in our fields and meadows and *Lonicera japonica* is nowhere mentioned in "Flora Cestrica." Notable by their absence from Darlington's list of weeds are *Mentha piperita, Pastinaca sativa, Prunus avium, Melilotus alba* and *Humulus lupulus.* Of the last he said, "Although cultivated in almost every garden it is undoubtedly indigenous along our streams." Yet he gave it place as a garden plant only.

In Edition Three first appeared *Ranunculus acris* (first seen in 1841), *Nasturtium officinale* (1838), *Lepidium campestre* (1853) and *Commelina communis* (1830). He stated that *Echium vulgare* was introduced near West Chester in 1851 and was first detected by Miss Harriet Harlan, a teacher of botany. He added, "It is a pernicious weed and farmers, as well as young lady botanists, will do well to keep a vigilant eye upon it."

It would appear that, in his later years, Dr. Darlington did not do much field work. Nearly all of his rarer plants are credited to "the discerning eye" of this or that "rising young botanist" of the County. He seems to have been the local authority to whom all curious finds were referred. One can imagine the venerable man in his office at the old Bank of Chester County, graciously receiving some friend from the country who has brought a strange plant for identification. In his preface to the "Flora Cestrica" of 1837 we read, "It may be in some measure perceived . . . how numerous are my obligations for specimens and a knowledge of localities to my friends in the County," and as in several instances he said, "the specimen being very imperfect," it was probably discarded after identification. His herbarium, so far as I have examined it, contains very little local material. Credit was given to Joseph Rinehart for most of the collections from the Schuylkill Valley; William Jackson and Joseph M. Barnard are frequently mentioned in connection with this or that rarity, often with a complimentary reference to their powers of observation; and from the southern townships the doctor's "indefatigable friend," Joshua Hoopes, brought him many new things.

Excepting the Schuylkill Valley, Wynn's meadows at the head-waters of Marsh Creek, and the country around Pughtown and Kimberton, not much collecting appears to have been done in the northern parts of the County. West Caln Township, the region around the falls of French Creek, Honeybrook and the Octoraro Valley were evidently neglected. These localities have since furnished considerable native material unknown to Darlington and are still full of fascinating possibilities. Gilbert White says, "All nature is so full that that district produces the greatest variety which is most examined." I have been studying plants in Chester County for a number of years with the hope ever in mind of re-discovering all of Darlington's species and in my excursions have turned up so many which he did not find that I now append a list of them. Many of these were, no doubt, known to him but were not given specific rank. Others he did not differentiate from their close relations. Still others he never found in the county.

The following list, based on my own observations, does not include the many records of other collectors which would greatly enlarge it and which I hope sometime to be able to include in a more nearly complete catalogue.

The Local Herbarium of the Academy of Natural Sciences contains duplicates of nearly all of my rarer plants. Most of my more difficult species have been checked by Mr. Bayard Long, of the Academy, whom I have to thank for unfailing help and encouragement.

The nomenclature and arrangement follow as nearly as possible "The Flora of the Vicinity of New York" (1915) by Norman Taylor.

PLANTS, NATIVE TO CHESTER COUNTY, WHICH ARE NOT LISTED IN "FLORA CESTRICA."

Localities are given in connection with plants which are rare in the county and indicate points near which they have been found. "Common" and "frequent" indicate more or less general distribution.

Filix bulbifera (L.) Underw.—On limestone rocks, Coatesville.
" *fragilis* (L.) Gilib.—On rocks and old walls, frequent.
Lorinseria areolata (L.) Presl.—Cold swamp, Sadsburyville.
Asplenium ebenoides R. R. Scott.—Rocky bluff, Octoraro Creek in Nottingham Twp.
Asplenium pinnatifidum Nutt.—On rocks, Atglen.
" *montanum* Willd.—On rocks, Atglen.
Pinus pungens Mill.—Rocky bluff, Atglen.
Sparganium eurycarpum Engelm.—Margins of creeks and ponds, frequent. (Probably the *S. americanum* of F. C. 3.)
Potamogeton dimorphus Raf.—In running water, Darby Creek near Berwyn.
Potamogeton epihydrus Raf.—In quiet water, frequent.
" *amplifolius* Tuckerm.—In shallow water, Icedale. (*P. natans* of F. C. 3 was without doubt this species.)
Sagittaria rigida Pursh.—Edge of canal, Spring City. (Listed as *S. heterophylla* in F. C. 2, reduced to a synonym of *S. variabilis* Engelm. in F. C. 3.)
Sagittaria pubescens Muhl.—In shallow water and mud, common. (Mentioned as a variety of *S. variabilis* in F. C. 2.)
Sagittaria longirostra (Micheli) J. C. Smith.—In shallow water, Icedale, Pomeroy.
Andropogon elliottii Chapm.—Roadsides and old fields, frequent.
Paspalum pubescens Muhl.—Fields and meadows, frequent. (Listed as a synonym of *P. setaceum* Mx. in F. C. 2.)
Paspalum circulare Nash.—Meadow, Bacton.
Panicum gattingeri Nash.—Roadsides, frequent.
" *philadelphicum* Bernh.—Edges of woods, frequent.
" *linearifolium* Scribn.—Dry soil, Phoenixville; Serpentine Barrens, W. Nottingham Twp.
Panicum sphaerocarpon Ell.—Serpentine Barrens, Willistown Twp., W. Nottingham Twp.
Panicum lucidum Ashe.—Swamps, Sadsburyville, Brandamore.
" *microcarpon* Michx.—Moist thickets, common.
" *annulum* Ashe.—Serpentine Barrens, W. Nottingham Twp.
" *lindheimeri* Nash.—Serpentine Barrens, W. Nottingham Twp.
" *huachucae* Ashe.—Dry banks, roadsides, common.
" *villosissimum* Nash.—Dry soil, Coatesville.
" *meridionale* Ashe.—Sandy woods, Sadsburyville.
" *tennesseense* Ashe.—Sandy woods, Brandamore. (Darlington seems to include nearly all of the narrow-leaved Panicums under *P. dichotomum* L.)
Panicum scribnerianum Nash.—Serpentine Barrens, Willistown Twp., Nottingham Twp.

Panicum ashei Pearson.—Dry woods, rocky banks, frequent.
" *commutatum* Schult.—Rocky woods, Coatesville, Valley Forge.
" *latifolium* L.—Dry woods, Frazer, St. Peters. (*P. latifolium* of F. C. 3 appears to have been *P. boscii* Poir.)
Chaetochloa imberbis (Poir.) Scribn.—Moist soil, probably frequent.
Oryzopsis racemosa (J. E. Smith) Ricker.—On limestone rocks, Coatesville.
Aristida purpurascens Poir.—Serpentine Barrens, West Chester.
Muhlenbergia foliosa Trin.—Moist spots, Downingtown, Nottingham Twp. (Probably included under *M. mexicana* Trin. in F. C. 3.)
Sporobolus heterolepis A. Gray.—Serpentine Barrens, W. Nottingham Twp.
Deschampsia flexuosa (L.) Trin.—Dry soil, rocks, Spring City, W. Nottingham Twp. (Listed in F. C. 2, withdrawn from F. C. 3.)
Danthonia compressa Austin.—Dry woods, northern parts of county, frequent.
Eragrostis frankii Steud.—Moist roadside, Coatesville.
Sphenopholis nitida (Spreng.) Scribn.—Rocky woods, frequent.
Uniola latifolia Michx.—Rocky bank along Octoraro Creek, W. Nottingham Twp.
Poa sylvestris A. Gray.—Rocky woods, Lenape, Valley Forge.
" *brachyphylla* Schult.—Rocky banks near Lenape. (Probably *P. pungens* of F. C. 3.)
Panicularia torreyana (Spreng.) Merr.—Cold woods, northern part of county. (Mentioned in F. C. 3 as an unverified plant of the county.)
Cyperus rivularis Kunth.—Moist ground, Willistown Twp.
Scirpus sylvaticus L.—Wet meadows, Brandamore, Sadsburyville, (Listed as a synonym of *S. atrovirens* Muhl. in F. C. 2.)
Scirpus eriophorum Michx.—Swamps and wet meadows, not common. (*S. eriophorum* of F. C. 3 probably included also *S. cyperinus* (L.) Kunth., the latter much more common.)
Carex convoluta Mackenzie.—Rocky woods, frequent.
" *aggregata* Mackenzie.—Rocky woods, frequent. (Probably in part *C. muhlenbergii* of F. C. 3.)
Carex conjuncta Boott.—Meadow, Phoenixville.
" *annectens* Bicknell.—Meadows and thickets, common.
" *laevivaginata* (Kuken.) Mackenzie.—Swampy woods, northern part of county, frequent.
Carex cephalantha (Bailey) Bicknell.—Swampy spot, serpentine barren, Willistown Twp. (Probably in part *C. stellulata* of F. C. 3.)
Carex incomperta Bicknell.—Wet meadows, Bacton, Birchrunville. (Probably in part *C. stellulata* of F. C. 3.)
Carex seorsa E. C. Howe.—Wet thicket, Sadsburyville.
" *cristatella* Britton.—Swamps and thickets, frequent.
" *brevior* Mackenzie.—Fields and thickets, Easttown Twp., Phoenixville.
Carex normalis Mackenzie.—Dry woods, frequent. (Probably in part *C. straminea* of F. C. 3.)
Carex bicknellii Britton.—Serpentine Barren, Willistown Twp.
" *willdenovii* Schk.—Rocky woods, Cromby, Harmonyville.
" *jamesii* Schwein.—Rocky hill near Lenape.
" *communis* Bailey.—Rocky woods, Phoenixville, Lenape.
" *varia* Muhl.—Dry soil, edges of woods, frequent. (Mentioned as a doubtful variety of *C. pennsylvanica* Lam. in F. C. 3.)

Carex albicans Willd.—Rocky woods, frequent.

" *nigro-marginata* Schwein.—Rocky woods, northern part of county, frequent.

" *umbellata* Schk.—Rocky woods, northern part of county, frequent.

" *tonsa* (Fernald) Bicknell.—Dry wood, Honeybrook.

" *laxiculmis* Schwein.—Woodlands, frequent.

" *blanda* Dewey.—Dry banks, roadsides, common. (Probably included under *C. anceps* Willd. in F. C. 3.)

Carex styloflexa Buckley.—Moist woods, northern parts of county.

" *gracilescens* Steud.—Moist woods, northern parts of county.

" *oligocarpa* Schk.—Rocky wood near Lenape. (Listed as a species in F. C. 2, reduced to a synonym of *C. digitalis* Willd. in F. C. 3.)

Carex grisea Wahl.—Open woods, roadsides, frequent. (*C. grisea* of F. C. 3 was evidently *C. glaucodea* Tuckerm.)

Carex swanii (Fernald) Mackenzie.—Open woods and banks, frequent.

" *caroliniana* Schwein.—Meadows, Phoenixville, Birchrunville.

" *bushii* Mackenzie.—Fields and meadows, frequent.

" *gynandra* Schwein.—Swampy woods, northern parts of county, frequent.

Carex vestita Willd.—Moist thicket, Coatesville.

" *folliculata* L.—Swampy wood, Sadsburyville.

" *comosa* Boott.—Swampy woods and meadows, frequent.

" *frankii* Kunth.—Bank of Schuylkill River, Perkiomen Junction.

Arisaema pusillum (Peck) Nash.—Moist woods, meadows, frequent.

Juncus secundus Beauv.—Dry, sandy soil, especially on serpentine, not common.

Juncus aristulatus Michx.—Meadow near Oxford. (Mentioned as a synonym of *J. marginatus* Rostk. in F. C. 2.)

Juncus canadensis subcaudatus Engelm.—Springs and swamps, northern part of county.

Melanthium latifolium Desf.—Rocky woods, not common.

Smilax hispida Muhl.—Moist thickets, Coatesville, Icedale.

" *glauca* Walt.—Borders of swamps and moist woods, common. (Probably included under *S. rotundifolia* L. in F. C. 3, the description of which seems to include characters of both species.)

Sisyrinchium mucronatum Michx.—Serpentine barrens, W. Nottingham Twp. (Included in F. C. 2, reduced to a variety of *S. bermudianum* L. in F. C. 3.)

Ibidium heckii (Lindl.) House.—Sandy soil, Laurel, Sadsburyville.

Salix bebbiana Sargent.—Moist wood, Harmonyville.

Betula lutea Michx.—Rocky wood, Dorlan.

Urtica gracilis Ait.—Thicket, Valley Forge.

Persicaria punctata (Ell.) Small.—Moist grounds, fields and roadsides, common. (Included under *Polygonum hydropiper* L. in F. C. 3.)

Tiniaria cilinodis (Michx.) Small.—Thicket, Honeybrook.

" *cristata* (Engelm. & Gray) Small.—Rocky woods, Lenape, St. Peters.

Chenopodium boscianum Moq.—Roadsides in shade, frequent.

Anychia polygonoides Raf.—Rocky woods, Atglen, Ludwigs Corner.

Coptis trifolia (L.) Salisb.—Moist wood, Harmonyville.

Thalictrum revolutum D.C.—Rocky bank, W. Nottingham Twp.

Cardamine parviflora L.—Rocky woods, Phoenixville, Harmony Hill.

Grossularia rotundifolia (Michx.) Coville & Britton.—On limestone rocks near Malvern.

Spiraea alba DuRoi.—Wet thickets, Icedale, Honeybrook.

Potentilla pumila Poir.—Dry banks, old fields, frequent.

Fragaria vesca L.—Rocky woods, northern parts of county.

Agrimonia gryposepala Wallr.—Moist woods and banks, frequent.

" *rostellata* Wallr.—Dry woods, Valley Forge.

" *pubescens* Wallr.—Dry woods, frequent.

" *striata* Michx.—Edge of wood near Malvern, Valley Forge.

" *parviflora* Soland.—Meadows, frequent.—(Darlington recorded only *A. eupatoria*, which probably included several of the above five species.)

Geum canadense Jacq.—Edges of woods, orchards, common. (Probably included under *G. virginianum* L. in F. C. 3.)

" *hirsutum* Muhl.—Shady grounds, Coatesville.

" *strictum* Soland.—Roadside, Coatesville.

Rubus strigosus Michx.—Rocky bank, Dorlan.

" *nigrobaccus* Bailey.—Hilly woods, dry thickets, common.

Rosa virginiana Mill.—Thickets near Malvern.

Aronia arbutifolia (L.) Medic.—Moist thickets, Sadsburyville.

" *melanocarpa* (Willd.) Britton.—Thickets and open woods, common. (Probably *Pyrus arbutifolia* of F. C. 3.)

Amelanchier laevis Wiegand.—Rocky woods, Harmony Hill.

" *intermedia* Spach.—Moist thicket, Brandamore. (Probably *A. ovalis* of F. C. 2, reduced to a synonym of *A. canadensis* T. & G. in F. C. 3.)

Crataegus straminea Beadle.—Serpentine Barren, Unionville.

" *macrosperma* Ashe.—Meadows, Wawaset. (Probably included under *C. coccinea* L. in F. C. 3.)

Crataegus pruinosa (Wendl.) K. Koch.—Rocky hillside near Coatesville. (Probably included under *C. coccinea* in F. C. 3).

Prunus pennsylvanica L. f.—Rocky woods, St. Peters, W. Nottingham Twp.

Stylosanthes riparia Kearney.—Serpentine Barren, W. Nottingham Twp.

Lespedeza repens (L.) Bart.—Dry woods, frequent. (Probably included under *L. procumbens* Mx. in F. C. 3.)

Lespedeza virginica (L.) Britton.—Dry soil, Willistown Twp., W. Nottingham Twp. (Probably *L. reticulata* of F. C. 2.)

Lespedeza frutescens (L.) Britton.—Dry soil, frequent. (Probably *L. sessiliflora* of F. C. 2.)

Strophostyles umbellata (Muhl.) Britton.—Serpentine Barrens, W. Nottingham Twp. (Probably *Phaseolus helvolus* of F. C. 3.)

Falcata pitcheri (T. & G.) Kuntze.—Moist thicket, Laurel.

Xanthoxalis filipes Small.—Woods and shady places, frequent.

" *cymosa* Small.—Gardens and waste ground, common.

Cathartolinum striatum (Walt.) Small.—Meadow on Darby Creek near Berwyn.

Cathartolinum medium (Planch.) Small.—Dry soil, W. Nottingham Twp., Willistown Twp.

Zanthoxylum americanum Mill.—Thicket near Malvern.

Polygala nuttallii T. & G.—Open woods, on shale, frequent.

Acalypha gracilens A. Gray.—Fields and open places, frequent.

Callitriche austinii Engelm. Mossy wood roads, Honeybrook, Bacton.

Acer spicatum Lam. Along Valley Creek at Valley Forge.

Vitis vulpina L. Banks of Brandywine Creek near Lenape.

Hypericum dissimulatum Bicknell.—Swampy thicket, Sadsburyville.

Crocanthemum majus (L.) Britton.—Dry sandy soil, Willistown Twp., Sadsburyville.

Lechea racemulosa Michx.—Sandy roadside near Sadsburyville.

" *leggettii* Britton & Hollick.—Sandy soil, open woods, frequent. (Probably included under *L. minor* Lam. in F. C. 3.)

Viola obliqua Hill.—Moist woods, frequent. (Mentioned as a synonym of *V. cucullata* Ait. in F. C. 2.)

" *stoneana* House. Moist woods, Sadsburyville, Unionville.

" *triloba* Schwein.—Woodlands, roadsides, frequent. (Probably included under *V. palmata* L. in F. C. 3.)

" *sororia* Willd.—Woods and roadside, common. (Listed in F. C. 2, reduced to a variety of *V. cucullata,* in F. C. 3.)

" *hirsutula* Brainerd.—Rocky woods, frequent. (Mentioned under *V. sororia* in F. C. 2.)

" *fimbriatula* Sm.—Dry ground, fields and roadsides, common. (*V. ovata* Nutt. of F. C. 2, reduced to a variety of *V. sagittata* Ait. in F. C. 3.)

" *emarginata* LeConte.—Sandy soil, W. Bradford Twp., W. Caln Twp. (Referred to under *V. sagittata* in F. C. 2.)

" *pallens* (Banks) Brainerd.—Springs and swampy spots, not common. (Probably included under *V. blanda* Willd. in F. C. 3.)

" *rafinesquii* Greene.—Sandy roadside, W. Nottingham Twp.

Raimannia laciniata (Hill) Rose.—Railroad bank, Coatesville.

Kneiffia fruticosa (L.) Rainmann.—Dry soil, fields and thickets, not common. (*Oenothera fruticosa* of F. C. 3 was mainly *K. linearis* (Michx.) Spach.)

Kneiffia pumila (L.) Spach.—Dry fields, roadsides, frequent.

Sanicula gregaria Bicknell.—Moist thickets, frequent. (Mentioned under *S. marylandica* L. of F. C. 3, as a yellow-flowered variety.)

Cornus rugosa Lam.—Rocky woods, Valley Forge, W. Nottingham Twp.

Vaccinium atrococcum (A. Gray) Heller.—Moist thicket, Laurel.

" *angustifolium* Ait.—Rocky woods, Cedarville, Valley Forge.

Bartonia paniculata (Michx.) Robinson.—Moist thicket, Sadsburyville.

Apocynum medium Greene.—Moist thicket, W. Nottingham Twp.

Asclepias pulchra Ehrh.—Meadows, common. (Included under *A. incarnata* L. in F. C. 3.)

Phacelia purshii Buckl. —Thicket near Coatesville.

Lycopus uniflorus Michx.—Moist thickets, frequent.

" *rubellus* Moench.—Moist soil, canal bank, Spring City.

Scrophularia leporella Bicknell.—Woods and thickets, frequent. (Included under *S. nodosa* of F. C. 3.)

Galium tinctorium L.—Moist thickets, Icedale, St. Peters. (Mentioned in F. C. 3, as a variety of *G. trifidum* L.)

" *claytoni* Michx.—Moist thickets, northern part of county.

Viburnum pubescens (Ait.) Pursh.—Rocky hill, Phoenixville.

" *canbyi* (Ait.) Pursh.—Woods and thickets, frequent.

" *cassinoides* L.—Moist wood, Harmonyville. (Mentioned as a variety of *V. nudum* L. in F. C. 3.)

Triosteum aurantiacum Bicknell.—Rich woods, frequent.

Micrampelis lobata (Michx.) Greene.—Moist thicket, Darby Creek near Berwyn.

Campanula rotundifolia L.—Rocky bluffs, W. Nottingham Twp.

Vernonia glauca (L.) Britton.—Roadside, Kennett Square.

Elephantopus carolinianus Willd.—Rocky bank, W. Nottingham Twp.

Eupatorium maculatum L.—Moist soil, meadows and thickets, frequent. (Listed as a variety of *E. purpureum* L. in F. C. 2.)

Eupatorium trifoliatum L.—Rocky woods, frequent. (Mentioned as a variety of *E. purpureum* in F. C. 3; listed as a questionable species in F. C. 2).
Eupatorium pubescens Muhl.—Dry soil, W. Nottingham Twp.—(Probably *E. rotundifolium* of F. C. 3.)
Solidago neglecta T & G.—Meadow, Elk Creek near Lincoln University.
" *juncea* Ait.—Roadsides, thickets, frequent.
" *altissima* L.—Meadows, frequent. (*S. altissima* of F. C. 3 was evidently *S. rugosa* Mill.)
Aster schreberi Nees—Moist wood, Clonmell, Phoenixville.
" *dumosus* L.—Meadow, Elk Creek near Lincoln University.
" *acuminatus* Michx.—Rocky wood, Icedale.
" *depauperatus* (Porter) Fernald.—Serpentine barrens, Willistown Twp., W. Nottingham Twp.
Antennaria neodioica Greene.—Dry banks, frequent. (Mentioned as a variety of *A. plantaginifolia* (L.) Richards. in both editions.)
Antennaria neglecta Greene.—Dry fields, common.
" *fallax* Greene.—Dry banks and thickets, frequent.
" *parlinii* Fernald.—Open woods, Harmonyville.
Senecio pauperculus Michx.—Dry banks and thickets, frequent. (Mentioned as a doubtful variety of *S. aureus* L. in F. C. 3.)
" *obovatus* Muhl.—On rocks, Phoenixville.
" *smallii* Britton.—Serpentine Barrens, W. Nottingham Twp.
Lactuca floridana (L.) Gaertn.—Roadsides and meadows, rather rare.
Nabalus serpentarius (Pursh) Hook.—Rocky woods, Icedale, Valley Forge.
" *trifoliatus* Cass.—Rocky woods, frequent.

Introduced Plants which are not Listed in "Flora Cestrica."

Miscanthus sinensis Anderss.
Heleochloa schoenoides (L.) Host.
Arrhenatherum elatius (L.) Beauv.
Capriola dactylon (L.) Kuntze.
Festuca ovina L.
Bromus tectorum L.
" *inermis* Leyess.
" *commutatus* Schrad.
Hordeum jubatum L.
Muscari botryoides (L.) Mill.
" *racemosa* (L.) Mill.
Asparagus officinalis L.
Leucojum aestivum L.
Gemmingia chinensis (L.) Kuntze.
Populus alba L.
Salix purpurea L.
Humulus lupulus L.
Rumex altissimus Wood.
Polygonum erectum L.
Persicaria lapathifolia (L.) S. F. Gray.
Fagopyrum fagopyrum (L.) Karst.
Amaranthus blitoides S. Wats.
Alsine aquatica (L.) Britton.
Silene latifolia (Mill.) Britton & Rendle.
Silene noctiflora L.
Lychnis alba Mill.
Vaccaria vaccaria (L.) Britton.
Dianthus armeria L.
Ranunculus repens L.
Berberis thunbergii D.C.
Radicula sylvestris (L.) Druce.
Thlaspi arvensis L.
Alliaria alliaria (L.) Britton.
Norta altissima (L.) Britton.
Sinapis arvensis L.
Raphanus raphanistrum L.
Barbarea stricta Andrx.
" *verna* (Mill.) Aschers.
Armoracia armoracia (L.) Cockerell.
Arabis glabra (L.) Bernh.
Hesperis matronalis L.
Sedum triphyllum (Haw.) S. F. Gray.
Potentilla reptans L.
" *sulphurea* Lam.
Rubus phoenicolasius Maxim.
Rosa canina L.
Crataegus phaenopyrum (L.) Medic.
Prunus avium L.

Gleditsia triacanthos L.
Melilotus alba Desr.
" *officinalis* (L.) Lam.
Medicago sativa L.
Trifolium incarnatum L.
" *hybridum* L.
Amorpha fruticosa L.
Meibomia canadensis (L.) Kuntze.
Lespedeza striata (Thunb.) H. & A.
Vicia tetrasperma (L.) Moench.
Lathyrus latifolius L.
Geranium columbinum L.
Linum usitatissimum L.
Ailanthus glandulosa Desf.
Sanicula trifoliata Bicknell.
Pastinaca sativa L.
Aegopodium podagraria L.
Lysimachia nummularia L.
Vinca minor L.
Phlox paniculata L.
Asperugo procumbens L.
Myosotis scorpioides L.
Symphytum officinale L.
Monarda didyma L.
Mentha piperita L.
" *alopecurioides* Hull.
Perilla frutescens (L.) Britton.
Chaenorrhinum minus (L.) Lange.
Pentstemon digitalis Nutt.
" *calycosus* Small.
Veronica tournefortii Gmelin.
Plantago rugelii Dec.
" *aristata* Michx.
Symphoricarpos symphoricarpos (L.) MacM.
Lonicera sempervirens L.
" *japonica* Thunb.
" *morrowii* A. Gray.
Campanula rapunculoides L.
Xanthium americanum Walt.
" *commune* Britton.
Verbesina alba L.
Helianthus tuberosus L.
Centaurea nigra L.
Lapsana communis L.
Leontodon erythrospermum (Andrz.) Britton.
Lactuca virosa L.
Hieracium pratense Tausch.

William Aldworth Poyser

William Aldworth Poyser, a former member of the Philadelphia Botanical Club, died in Philadelphia on February 29, 1928. He was born in this city on January 29, 1882, and most of his life was spent here. One of his early teachers was the late Thomas G. Gentry, known for his interest in ornithology and archaeology, and Poyser's inherent love of nature was doubtless encouraged by this association.

He early became interested in ferns and scoured the country around Philadelphia, collecting specimens which he exchanged with botanists in various parts of the United States and abroad. In this way he amassed a valuable collection which was later purchased by the Academy.

Mr. Poyser joined the Club in 1906 and remained an active member until his removal to Hammond, Indiana, in 1910, when he became a Corresponding Member. Although he returned to his native city in 1914, he did not take up ferns again, as he had in the meantime transferred his interests to the rearing of goldfish and the study of aquarium life, extending later to microscopic study of diatoms, rotifers and other minute forms of animals and plants. He was for a time editor of a monthly journal, "Aquarium," and later, from 1919 to 1927, of a more pretentious journal, "Aquatic Life," which he was forced to relinquish on account of failing health.

Among his botanical publications are the following:

"Isoetes saccharata in the Delaware River." Fern Bulletin 15: 18. Ap. 1907.

"The Fern Flora of Pennsylvania." Fern Bulletin 17: 65–83. S. 1909.

"Notes on Local Ferns." BARTONIA 2: 22–25. F. 1910.

"The Identity of Asplenium Ferrissi with A. alternans." Fern Bull. 19: 33–36. O. 1911.

"Worth" Poyser had an attractive personality and his enthusiasm was contagious. No tramp was too arduous, if valuable specimens were to be obtained, while he devoted many hours to maintaining his correspondence with fellow students in all parts of the world. It was enlightening to go over one's herbarium with him and to realize the exactness and extent of his knowledge which resulted in the occasional discovery of rare species in the vicinity of Philadelphia that other botanists had failed to find.

In his death we lose one of the best-informed fern students that the Club has ever had, and we can but regret that his interest in later years turned to other fields.

He is survived by his widow, Mrs. Sue Henning Poyser, who was ever a most sympathetic companion in all of his work.

Jacob H. Grove

While it appears that Mr. Grove was born and educated and died in Pennsylvania, it is with the study of the flora of New Jersey that his name is associated. For many years he lived at New Egypt, about the center of the state and close to the junction of Burlington, Monmouth and Ocean counties. His large herbarium of that section, generously given to the Local Herbarium of the Academy, has added materially to the knowledge of the distribution of the flora of the Coastal Plain. The value of his records may be realized in turning the pages of Dr. Witmer Stone's "Plants of Southern New Jersey," noting the frequent mention of the locality "New Egypt." Among his most interesting finds were the earliest records for lowland New Jersey of *Carex pedunculata* Muhl., *Mitella diphylla* L., and *Geum strictum* Ait., the last a rare and often misunderstood species.

Always retiring in disposition and without immediate family, it has not been possible to obtain many details of his life. From a niece, Lena A. Burtis, we learn that he was born at Fredericksburg, Lebanon Co., Pennsylvania, October 14, 1853, that he was educated at Danville and then at the Chester Military Academy, Chester, Pa., going thence to Yale College, where he graduated in the Class of 1874. She says that it was at Yale that he became interested in botany. This interest remained a pleasant avocation through life, and bore fruit, not in published papers, but in the careful study of the plants of a neighborhood that was distinctly his own botanical province.

He died February 18, 1929, in Philadelphia, where he had spent the last two and a half years of his life.

John William Harshberger

Suddenly, Saturday, April 27, 1929, Dr. Harshberger died from heart failure. Only two evenings before, he had attended a meeting of the Philadelphia Botanical Club and had seemed in the best of health. He was then speaking with keen anticipation of his proposed trip to New Zealand and Australia this summer, and was to have addressed our May meeting on his last year's journey to northern Africa. Those of us who had listened a year ago to the account of his 1927 travels in Brazil, so well illustrated with views of the peculiar *Araucaria* forests, had counted much on this year's narrative.

The passing of Dr. Harshberger ends a long career of botanical activity. The details of his life are ready to hand in "The Life and Work of John W. Harshberger, Ph.D. An Autobiography" (with portrait), that was published early in 1928. Born in Philadelphia on January 1, 1869, he studied in the grammar and high schools of this city and then in the biological courses of the University of Pennsylvania from which institution he received the degree of Doctor of Philosophy in 1893. In the autumn of that year he was made Instructor in the Biological Department, becoming Assistant Professor of Botany in 1907 and Professor of Botany in 1911. In 1907 he was married. His wife died in 1923, but two daughters survive him.

Among American botanists none has had a wider range of interest than Professor Harshberger. Few have published more extensively, or on more sides of botanical science. His autobiography lists 320 titles of papers and books, and an appended classification by subjects shows that the largest number were devoted to ecology, the second largest to geographic distribution, with many titles also in history, in biography and in morphology. His books even include a "Text-book of Mycology." One marvels at such versatility, with the production of studies embodying observation and compilation on so vast a scale.

This account must be confined to the work of Professor Harshberger in the study of our Local Flora, southern New

Jersey, southeastern Pennsylvania, Delaware, and northeastern Maryland. A list of his papers concerning this area is appended to this sketch. They are of two types: (a) historical, and (b) geographical and ecological.

Dr. Harshberger early interested himself in gathering information about the history of botany in and around Philadelphia, and his first considerable book was "The Botanists of Philadelphia and Their Work," published in 1899. In it he traced the growth of botanical interest here from John Bartram and Adam Kuhn in the eighteenth century, down through the brilliant period of a hundred years ago, on through the more plodding years of the middle nineteenth century to the expanding interest of its closing decades. Biographical sketches were given of some hundred individual botanists, both of the past and the present, including quite a liberal number of the members of the then recently founded Philadelphia Botanical Club. The task of assembling and organizing the facts was carefully and conscientiously done, and the book is a mine of information upon its subject.

In the geographic and ecologic field Professor Harshberger assembled data assiduously in the effort to explain the origin and dispersal of floras. His view was broad, and took account of the geologic background, as well as of the present forms of life. His accounts of the plants of New Jersey and Pennsylvania—as of Florida, the mountains of North Carolina, and elsewhere—pictured the vegetation by the method of grouping component species into a series of "societies" or "associations," each comprising those found growing together. The system had been used abroad with brilliant results, and Dr. Harshberger was one of the first in applying it to our flora. For right success the method seems singularly exacting, requiring that the identity of the component species be fully mastered and the validity of the proposed associations be tested by many repeated observations. Perhaps, with all their excellent suggestions, we may express our regret that his papers of this class were not based upon longer individual study and that effort was not made to gather herbarium specimens as vouchers for all his records. But, while much of his work was preliminary, he has undoubtedly shown us a new viewpoint, rich with possibilities, for the consideration of our "Local Flora."

The greatest single botanical undertaking of Professor Harshberger's life, the "Phytogeographic Survey of North America," published in 1911 (in English) as volume XIII of the German series "Die Vegetation der Erde," perhaps lies beyond the limit of this sketch. But it has a right to interest us because our area was so fully considered and the relationships of our flora discussed. Here were outlined the phytogeographic regions of a continent, while the effort was made to apply on a continental scale the scheme of "formations" and "associations." From many sources data were compiled until the work grew to over 700 pages. But the task was too great for one man, nor was information at hand sufficient to make possible any uniform or adequate treatment on the lines attempted. Many areal limits are undoubtedly excellent, but it is difficult to feel confident of the lists of species presented, compiled as they are from every available source. In botany recorded names can not be freely accepted at their face value; they must be checked in the light of later critical studies on the group in question and allowance must be freely made for names wrongly assigned through carelessness or honest error. Although we appreciate the courage that was needed in attempting a project of such magnitude, it seems to us that a less ambitious volume, outlining geographic areas of distribution without the superposition of ecological "formations" and citing plants by genera rather than by species, would have been a clearer and stronger work.

Notes, books and reviews by Professor Harshberger continued with unabated zeal, and we turn with pleasure to such lighter essays as his accounts of "The Old Gardens of Pennsylvania," published in "The Garden Magazine" in 1920 and 1921. There, with the help of good illustrations, he told about ten gardens, among which were Bartram's, Humphry Marshall's, Painter's, and John Evans' Arboreta. He was ever glad to share his information, and I hope he realized how many readers of the magazine took a real pleasure in those sketches. They seemed a return to his early historic studies.

An interest of Dr. Harshberger's that shows his unfailing willingness to help a cause that needed him was his Chairmanship of the Pennsylvania Chapter of the Wild Flower Preservation Society. That one with so many demands upon his time, besides the various scientific projects he was pursuing, should for eight years have given much time to the work deserves the thanks of those who are concerned for the conservation of our beautiful native flowers and for the growth of public appreciation of them.

Professor Harshberger traveled much, in 1896 to Mexico, in 1898, 1907 and 1923 to Europe, in 1901 to the West Indies, and in the last three years of his life seems to have commenced an extensive program for which he had every prospect of adequate years. In 1926 he visited Alaska, in 1927 much of South America, in 1928 northern Africa, and, as said at the opening of this sketch, in 1929 he had planned to visit the antipodes, Australia and New Zealand. Of recent years the Professor has been familiar to the members of the Philadelphia Botanical Club chiefly through his reports of journeys from time to time. We have always known that we could ask him freely to share with us the store of botanical experience that he had gathered.

PUBLICATIONS OF DR. J. W. HARSHBERGER DEALING WITH LOCAL BOTANISTS OR WITH THE "LOCAL FLORA"

"The Wissahickon Woods." Garden and Forest 4: 129. 1891.
"Local Plant Names in New Jersey." Gard. & For. 5: 395. Ja., 1892.
"James Logan, an Early Contributor to the Doctrine of Sex in Plants." Botanical Gazette 19: 307. Au., 1894.
"John Evans and his Garden." Gard. & For. 10: 182. My., 1897.
"The Botanists of Philadelphia and Their Work." 457 pp. + *49 ill.* Philadelphia, 1899.
"Philadelphia Botanists commemorated in the Names of Plants." Plant World 3: 74. My., 1900.
"An Ecological Study of the Jersey Strand Flora." Proceedings of the Academy of Natural Sciences of Philadelphia 52: 623–671. 1900.
"Doctor Adam Kuhn, First Professor of Botany in America, and at the University of Pennsylvania." Alumni Register 6: 327–333. Ap., 1902.

"Additional Observations of the Strand Flora of New Jersey." Proc. Acad. Nat. Sci. Phila. 54: 642–669. 1902.

"Forest Growth at Wildwood, N. J." Forest Leaves 9: 40. Je., 1903.

"The Flora of the Serpentine Barrens of Southeast Pennsylvania." Science II. 18: 339–343. S., 1903.

"A Phyto-geographic Sketch of extreme Southeastern Pennsylvania." Bulletin of the Torrey Botanical Club 31: 125–129. Mr., 1904.

"The comparative Age of the different Floristic Elements of Eastern North America." Proc. Acad. Nat. Sci. Phila. 56: 601–615. 1904.

"The comparative Leaf Structure of the Strand Plants of New Jersey." Proceedings of the American Philosophical Society 48: 72–89. *4 pl.* 1909.

"The Vegetation of the Salt Marshes and of the Salt and Fresh Water Ponds of Northern Coastal New Jersey." Proc. Acad. Nat. Sci. Phila. 61: 373–400. 1909.

"The Plant Formations of the Nockamixon Rocks, Penna." Bull. Torrey Bot. Club 36: 651–673. D., 1909.

"The Vegetation of the Navesink Highland." Torreya 10: 1–10. Ja., 1910.

"Dr. Abram P. Garber, Botanist '72 M." Old Penn Weekly Review 14: 119. O., 1915.

"The Origin and Vegetation of Salt Marsh Pools." Proc. Amer. Philos. Soc. 55: 481–484. *5 pl.* 1916.

"The Vegetation of the New Jersey Pine Barrens." 329 pp. + *284 figs.* Philadelphia, 1916.

"Pennsylvania Men commemorated in the Names of Plants." Alumn. Reg. 19: 448–452. *11 figs.* Ap., 1917.

"The New Jersey Pine Barrens." American Museum Journal 17: 244–252. *9 figs.* Ap., 1917.

"William Young, Jr., of Philadelphia, Queen's Botanist." Torreya 17: 91–99. Je., 1917.

"American Heaths and Pine Heaths." Brooklyn Botanic Garden Memoirs 1: 175–186. *8 figs.* Je., 1918.

"Slope Exposure and the Distribution of Plants in Eastern Pennsylvania." Bulletin of the Geographical Society of Philadelphia 17: 53–61. *4 figs.* Ap., 1919.

"The Old Gardens of Pennsylvania." Garden Magazine 32: 78–80, 137–139, 257–258, 326–328, 1920; 33: 44–46, 120–123, 195–196, 255–256, 326–329, 374–377. 1921. (*Illus.*)

"Natural Areas and Regions—Pennsylvania" in "Naturalist's Guide to the Americas." 338–341. 1926.

Hugh B. Meredith

On August 1, 1929, Dr. H. B. Meredith died, after a protracted illness. He was nearly seventy-six years of age, of which less than nine had been associated with the Philadelphia Botanical Club. But in those late years of his life he had shown unusual skill in botanical technique and had become one of our most valued members.

Dr. Meredith was born at Doylestown, Bucks County, Pennsylvania, October 29, 1853. Soon after graduating from the medical department of the University of Pennsylvania in 1877, he moved to Danville, Montour County, where he remained for over forty years as assistant superintendent and, after 1891, as superintendent of the State Hospital for the Insane. In the latter year he married Miss Mary S. Eyer, of Bloomsburg, who with a daughter survives him.

On retiring from administrative duties in 1920, Dr. Meredith moved to Philadelphia and promptly joined the Philadelphia Botanical Club. All his life he had enjoyed botanizing, as is evidenced by his gifts to the Academy of plants gathered years ago in Montour and Columbia counties along the upper Susquehanna River or obtained on various vacation trips to the West and South. But after 1920 and with the stimulus of the quality of the specimens in our Local Herbarium, he started collecting anew. Local excursions, trips to various parts of Virginia, and for the last summers of his life to Berkshire County, Massachusetts, gave opportunity for mastering the art. Few recent collections have equaled his in beauty, and they have been welcome additions to the Academy's Herbarium. He generously permitted his duplicates to be used on behalf of the Academy's exchanges, and appreciations of them have reached us from as far as Sweden and Japan.

Until a year ago when his serious confinement began, Dr. Meredith worked daily at the Academy, identifying not only his own plants but also those of other collectors. Careful in his judgments as in his technique, his was the temperament to have made valuable written contributions to our science, had he but been able to have given his best years to botany. It seems however that he published nothing on the subject.

General Notes

Summer Experiences. During the summer of 1929 several members of the Club have gone on expeditions. Mr. Robert F. Welsh visited Alaska and the Yukon, returning with an interesting collection of plants. Professor Samuel C. Palmer of Swarthmore College, who at this writing has applied for membership with us, was with Donald B. Macmillan's expedition to Baffin Land, from which and its outlying islands he has presented the Academy with a series of beautiful specimens. Mr. Bayard Long and Dr. John M. Fogg, Jr., have accompanied Professor M. L. Fernald of Harvard University on his latest journey to Newfoundland; for many years Mr. Long has been associated with Professor Fernald on his important field-trips to northeastern North America. Mr. Walter M. Benner studied *Lycopus* with Professor Wiegand at Cornell University, from whence he visited herbaria at Ottawa, Cambridge and New York.

Curator of Pteridophyta. Mr. Arthur N. Leeds, from its founding the treasurer of our Club and who followed his retirement from business three years ago with a journey around the world, has now assumed the Curatorship of Pteridophyta in the Academy's Herbarium. Already he has arranged the specimens throughout in definite geographic sequence, thus aiding their ready consultation. This spring and early summer he spent three months on an excursion by automobile through the southeastern states, gaining close acquaintance of both ferns and flowering plants.

Recent Additions to the Local Herbarium. Among many local specimens received, the most notable have come from Mr. Harold W. Pretz, of Lehigh County, Mr. Hugh E. Stone of Chester County, and Mr. Hans Wilkins, of Berks County, Pennsylvania. The main achievement of the year has been completing the task of selecting from the large private herbarium of Dr. Witmer Stone the specimens from localities not previously represented in our Herbarium. Thus we have acquired an especially valuable series from Chester County, while from across the Delaware we now possess plants from nearly all the localities cited in the "Flora of Southern New Jersey."

Program of Meetings during 1928

Date	Subject	Speaker	Attendance
Jan. 26	Recent additions to the Local native flora	Bayard Long	16
Feb. 23	The later history of the Academy's Herbarium	Dr. F. W. Pennell	20
Mar. 22	Some aspects of the New England flora	Dr. W. R. Taylor	16
Apr. 26	Vegetation of Brazil	Dr. J. W. Harshberger	14
May 24	A trip around the world	Arthur N. Leeds	17
Sept. 27	Reports of summer work by members; and discussion on local species of *Solidago*		18
Oct. 24	Our Sarracenias and their relations to insects	Frank Morton Jones	
	Local species of *Quercus*	Bayard Long	32
Nov. 21	The 1926 trip to Newfoundland	John M. Fogg, Jr.	
	Local species of *Vaccinium* and *Gaylussacia*	H. W. Trudell	19
Dec. 27	The subulate Phloxes	Dr. E. T. Wherry	
	Local species of *Pinus*	W. M. Benner	26

Officers and Members of the Philadelphia Botanical Club, 1929

WALTER M. BENNER, *President*
H. E. THOMPSON, *Vice-President*
HUGH E. STONE, *Secretary*
ARTHUR N. LEEDS, *Treasurer*
BAYARD LONG, *Curator*

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Edwin B. Bartram, Bushkill, Pa.	1906
J. Russell Bebler, 135 E. Phil Ellena St., Germantown, Phila.	1919
Walter M. Benner, 5636 Loretta Ave., Frankford, Philadelphia	1912
Carl E. Bliss, Welsbach Co., Gloucester, N. J.	1924
John A. Borneman, Norwood, Pa.	1912
Carl Boyer, Wagner Institute, 17th St. & Montgomery Ave., Phila.	1926
J. Claudius Boyle, 223 Kenmore Rd., Brookline, Pa.	1919
Rev. T. Royce Brendle, Egypt, Lehigh Co., Pa.	1918
Otway H. Brown, Cape May, N. J.	1925*
Dr. Herman A. Burgin, 212 High St., Germantown, Philadelphia	1915
James J. Burke, Addingham, Pa.	1919
Milton Campbell, Broad & Wallace Sts., Philadelphia	1928
F. Van Buren Connell, 3620 Baring St., Philadelphia	1924
Dr. Albert Cornog, 5836 Lansdowne Ave., Philadelphia	1923
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Dr. John M. Fogg, Jr., University of Pennsylvania, Philadelphia	1921
George W. Haag, North Wales, Pa.	1924
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F. F. Huber, Pennsburg, Pa.	1911
Dr. Ida A. Keller, 4424 Osage Ave., Philadelphia	1892
Addison D. Kern, 222 West Linton St., Philadelphia	1929
Miss Natalie B. Kimber, 538 E. Locust St., Germantown, Phila.	1928
Rev. William U. Kistler, 118 Main St.. Pennsburg, Pa.	1911
Prof. W. A. Kline, Ursinus College, Collegeville, Pa.	1911

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* Corresponding Member from 1908.

Dr. Henry A. Laessle, 5900 Market St., Philadelphia	1894
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Morris E. Leeds, 5321 Baynton St., Germantown, Philadelphia	Founder
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Adolf Müller, Box 66, Norristown, Pa.	1920
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Horace E. Thompson, 5016 Schuyler St., Germantown, Philadelphia	1920
Harry W. Trudell, 2030 E. Madison St., Philadelphia	1915
Prof. Rodney H. True, University of Pennsylvania, Philadelphia	1925
Walter Vandenhengel, 1726 N. 61st St., Philadelphia	1922
Clarence E. Varnum, Atco, N. J.	1923
Robert F. Welsh, 132 S. 4th St., Philadelphia	1909
C. S. Wertsner, 221 N. 13th St., Philadelphia	1920
Hans Wilkins, 241 S. 11th St., Reading, Pa.	1928
J. Gilbert Williams, 1517 N. 58th St., Philadelphia	1919

Edward W. Winsor, College Farm, New Brunswick, N. J.	1920
William H. Witte, 16 York St., Camden, N. J.	1929
Miss Mary F. Wright, Ambler, Pa.	1928

HONORARY MEMBERS

George W. Bassett, Secane, Pa.	1904*
Samuel Newman Baxter, Fernhill Park, Germantown, Phila.	1918*
Dr. Joseph S. Illick, Mont Alto, Pa.	1925
Dr. Henry Leffmann, 1729 N. 17th St., Philadelphia	1922
John J. Tyler, 106 E. Johnson St., Germantown, Philadelphia	1919
Samuel S. Van Pelt, 59 Bethlehem Pike, Chestnut Hill, Phila.	1902*
Dr. Edgar T. Wherry, 3383 Stephenson Place, Washington, D. C.	1925

CORRESPONDING MEMBERS

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Dr. Harold St. John, University of Honolulu, Honolulu, Hawaii	1927
Charles F. Saunders, Pasadena, Calif.	1893
Dr. John K. Small, New York Botanical Garden, New York City	1893
Dr. Campbell E. Waters, Washington, D. C.	1904
Dr. H. W. Youngken, Mass. College of Pharmacy, Boston, Mass.	1918

RECENTLY DECEASED MEMBERS

	Died
George M. Beringer, Founder	June 23, 1928
F. E. Draper, Active	Dec., 1928
Jacob H. Grove, Active	Feb. 18, 1929
Dr. John W. Harshberger, Active	Apr. 27, 1929
Dr. Hugh B. Meredith, Active	Aug. 1, 1929
W. Aldworth Poyser, Corresponding	Feb. 29, 1928
Willard A. Stowell, Active	Jan. 19, 1929

* Elected Active Members on these dates.

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No. 12 1930

BARTONIA

PROCEEDINGS OF THE
PHILADELPHIA BOTANICAL CLUB

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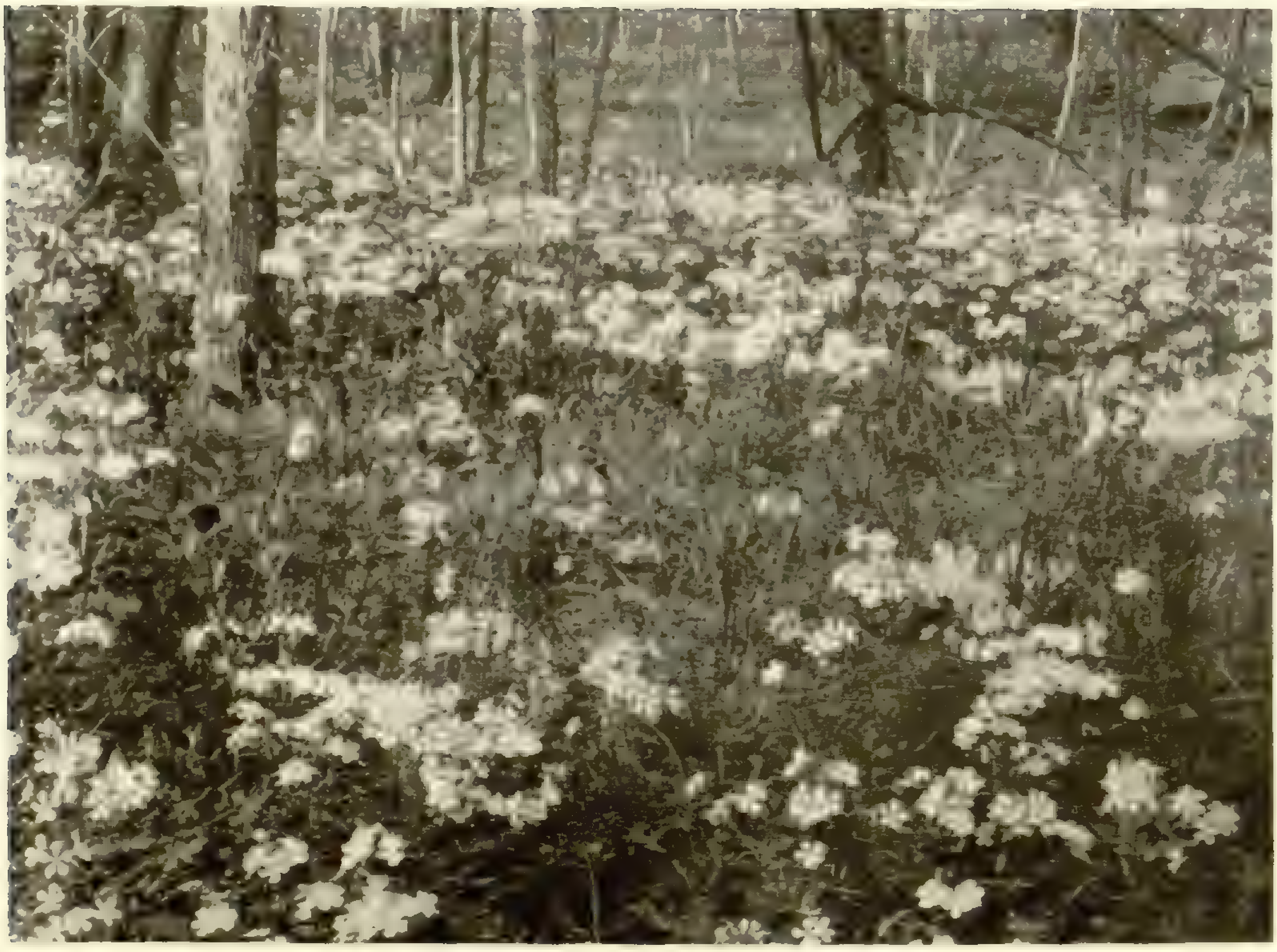

FIG. 1. *Phlox divaricata canadensis.*
Preserve of Washington Biologists' Field Club, Cabin John, Maryland.

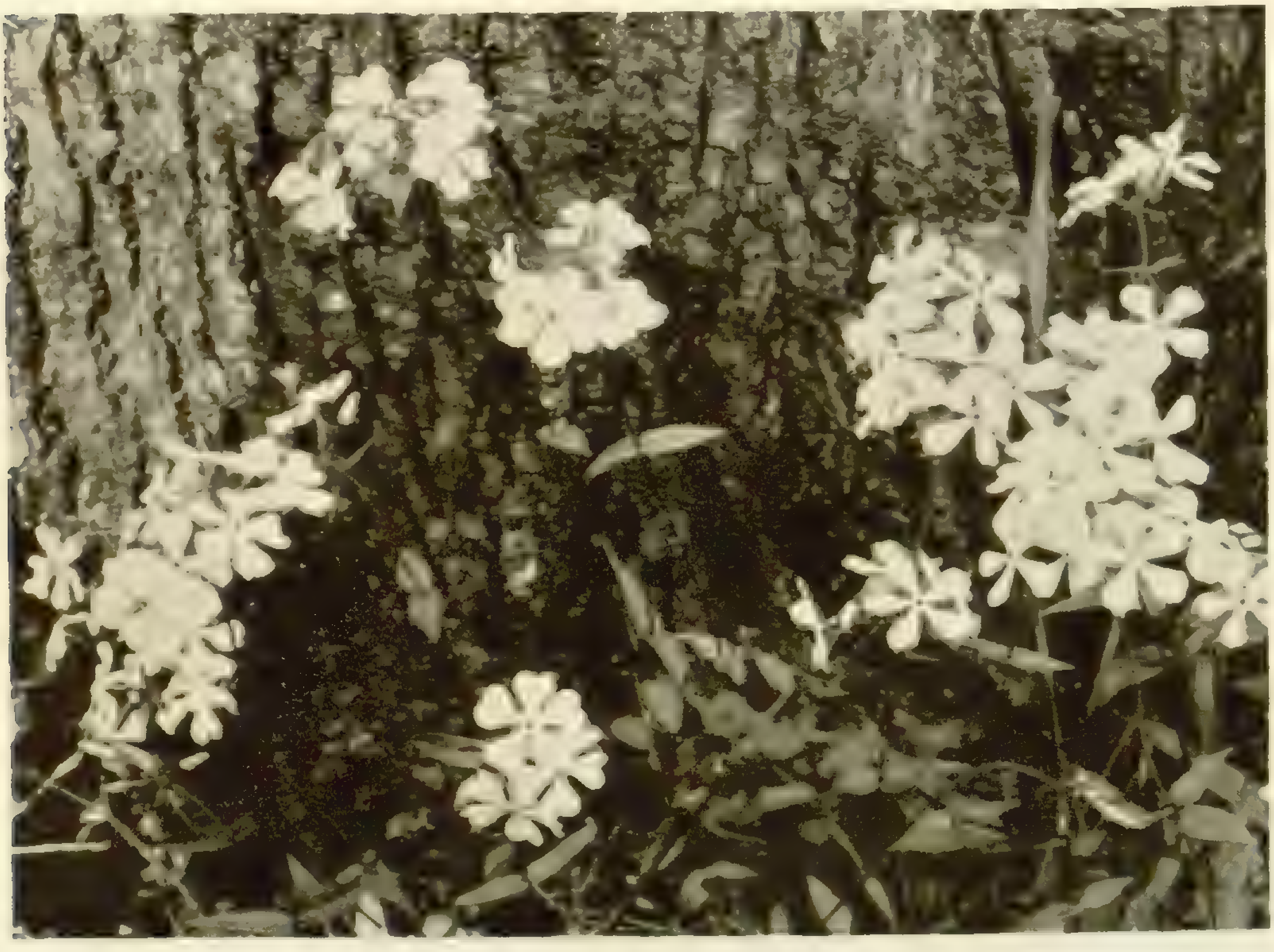

FIG. 2. Same species, variety, and locality.
Forms with notched, entire, and apiculate corolla-lobes growing together.

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BARTONIA

PROCEEDINGS OF THE PHILADELPHIA
BOTANICAL CLUB

No. 12 PHILADELPHIA, PA. 1929–1930

On some Critical Species of the Serpentine Barrens

FRANCIS W. PENNELL

Although outcrops of serpentine and related rocks occur in a broken chain from western Massachusetts to North Carolina, it is only in southeastern Pennsylvania and adjacent Maryland that the areas are of considerable size and bear a highly distinctive flora. Beginning at Lafayette along the Schuylkill River just above Philadelphia, the Serpentine Barrens are scattered like islands across Delaware, southern Chester and southern Lancaster counties, Pennsylvania, from whence they pass into Cecil and Harford counties, Maryland, crossing the Susquehanna River at the landmark of Bald Friar. The geologic map shows that they follow a narrow belt of gneiss and gabbro, dating from before the Paleozoic Era; this is the most eastern and lowest belt of what physiographers term the Piedmont Plateau, being sharply bounded inland by the later mica-schist of the South Valley Hill and coastward by the geologically recent sands and clays of the Atlantic Coastal Plain. It is a belt that before man's intervention was all but wholly covered by luxuriant deciduous forests.

Almost the only breaks in the wilderness must have been the park-like openings and grassy or stony knolls of the Serpentine Barrens. Today while much of the forest has been cleared for pasture and plowed fields, the true "Barrens" remain untouched, their sterility prohibiting agriculture. The yellow-green serpentine rock contains a high proportion of magnesium, and weathers into soil distinguished thereby from all other soils of our area. Hence may arise its unsuitability for man's crops, but hence also its interest to the botanist. For on the "Barrens" has developed a peculiar world of plant-life, a flora as unique as any in eastern North America.

Just twenty years ago, while a student at the University of Pennsylvania, I utilized the available time of two seasons in visiting by carriage, bicycle and train nearly all the Serpentine Barrens in Delaware and Chester counties, and in a paper on the "Flora of the Conowingo Barrens of southeastern Pennsylvania,"[1] there were discussed the local distribution and geographic relationships of the species found. A series of "Further Notes"[2] followed two years later. Since then for eighteen years specimens have been accumulating in the herbarium of the Philadelphia Botanical Club, and the time seems again ripe for a reconsideration of the flora of the Serpentine Barrens.

Especially has the automobile enabled us to explore more thoroughly the largest and richest of all our areas of serpentine rock, the great "Nottingham" or "State-line Barrens" that stretch from near the Elk Creek in southern Chester County southwestward by Nottingham and Sylmar across the Octoraro Creek into southern Lancaster County and northern Cecil County. Covered with pitch pines and undisturbed by man, the valleys near the Octoraro Creek have a wild beauty that contrasts with the intimate picturesqueness of deciduous woodland, field and meadow that is usual through the Piedmont hills. Most attractive of all is the immediate vicinity of Octoraro Creek itself, where below Lees Bridge and at the Oxbow curve on the state boundary, the stream has cut its gorge against and through the ridge of the Serpentine Barrens. My first trip to the cliffs of the Octoraro was in 1920 and scarcely a year has passed since without one or several journeys thither.

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[1] Proceedings of the Academy of Natural Sciences of Philadelphia 62: 541–584. 1911. As therein explained, the term "Conowingo Barrens" was adopted because in the Reports of the United States Bureau of Soils this had been used for the areas of thin magnesian soil that alone bear a peculiar flora. Much of the area underlain by serpentine and allied rocks has weathered further into the deeper soil of the "Conowingo Clay" which supports a flora quite similar to that of other sterile spots on the Piedmont Plateau.

[2] Proc. Acad. Nat. Sci. Phila. 64: 520–539. 1913.

There in rock-crevices grows luxuriantly the harebell, *Campanula rotundifolia,* mingled with the equally northern snowy bedstraw, *Galium boreale.* The Canada lettuce, true *Lactuca canadensis* with the mid-blade and segments of the leaves linear and entire, further emphasizes the northern affinity of the flora of these cliffs. But *Aster concinnus,* with greener leaves and more ample sprays of smaller flower-heads than has *A. laevis,* its close kin elsewhere on the Serpentine, is of very local occurrence and has been little found anywhere in its range. Most remarkable of all the plants of these rocky slopes, however, are the wide mats of the silky broad-leaved *Cerastium* to be described as new to science in the first of the following notes. It is a plant worthy of wide introduction into rock-gardens, but which under natural conditions has an occurrence probably as restricted as that of any plant in eastern North America.

Perhaps a future issue of "Bartonia" may reconsider the flora of the Serpentine Barrens with the fullness that the subject deserves. Now I wish merely to discuss certain critical species, concerning which recent collections and study have yielded new information. These cases have come to light during efforts to name local collections of Dicotyledones. Similar instances involving Monocotyledones are still to be studied. Indeed, many other problems must await attention, as, because the Serpentine flora is so unique and the plants are so diverse on the isolated individual "Barrens," it is quite likely that more taxonomic questions await decision there than in any like area of the northeastern United States.

I. SERPENTINE REPRESENTATIVES OF CERASTIUM ARVENSE L.

Cerastium arvense L. is a large-flowered species of mouse-ear chickweed that is usually credited with an exceedingly wide distribution over the Earth. Originally described by Linnaeus from Europe, its range has since been extended throughout the North Temperate zone of Asia and North America and into the South Temperate zone. It seemed a familiar plant to encounter on a recent collecting trip to the Andes of Chile. Yet it may be questioned whether the plant is a taxonomic unity throughout this vast area of occurrence, and especially does the doubt seem valid in view of the surprising range of variation shown by it on the Serpentine Barrens of the eastern United States.

Before considering the plants of serpentine or magnesian soil, however, we should note what is the prevalent form of this group on other formations over the eastern United States. Wide-spread on sandy or sterile soils, especially on rocky cliffs, is a plant with leaf-blades usually linear or narrowly lanceolate and narrowed at base, a species that was well named *Cerastium tenuifolium* by Pursh in 1814. Apparently he took the wider-leaved and hairier plant of the Pennsylvania Serpentine to be genuine *C. arvense* L., a judgment which posterity has reversed. We shall not now attempt to decide whether *C. tenuifolium* is identical with or varietally distinct from *C. arvense* of Europe, but in the discussion below shall compare with it the special forms that have developed upon our areas of serpentine.

Some representative of *Cerastium arvense* seems to be a constant inhabitant of all our areas of magnesian soil. Thanks to the kindness of Professor M. L. Fernald I have seen two collections from the small serpentine area at Florida, Berkshire County, Massachusetts, being Fernald and Long 9489 and a specimen gathered by Ralph Hoffman. Both show leaf-blades linear or nearly so, and narrowed at base in the manner characteristic of "tenuifolium." Other specimens from western Massachusetts loaned me, from arkose and other soils, near Amherst, Hampshire Co., and Deerfield and Sunderland, Franklin Co., are similar, showing only slight variation toward lanceolate leaf-blades. Thus, it seems evident that on the remote serpentine outcrops in western Massachusetts no special form of the species has been developed since the glacial recession.

On Staten Island, New York, occurs a famous and extremely isolated serpentine area. Here we are almost on the Terminal Moraine that marks the utmost advance of the ancient ice-sheet. At Grant City on May 17, 1919, I gathered again the narrow-leaved plant (No. 9943) "tenuifolium," while there also occurred plants (No. 9944) with nearly lanceolate leaf-blades, more rounded at base, very like the usual plant of the Pennsylvania Serpentine, and to be known by the same name.

In southeastern Pennsylvania and adjacent Maryland occur our series of Serpentine Barrens with a flora much more important than that of the trivial areas northward; moreover, these are south of the Terminal Moraine and there is every reason to believe that their flora has had a vastly longer period in which to achieve its present distinctness. No plant is so universally present on these Barrens as a large-flowered *Cerastium,* which is obviously not the narrow-leaved "tenuifolium"; its leaf-blades are prevailing lanceolate and more rounded at the base, while the plant bears an increased hairiness that is often slightly tawny. It is easy to contrast the plant invariable on the Serpentine with the surrounding "tenuifolium," and so true is the association of these plants with their respective geologic formations that they have been repeatedly considered as distinct species. But actual measurements break down each character that might be used in framing a key, until it would seem that each represents a predominance of traits rather than a clear-cut association.

On nearly all the Pennsylvania Serpentine Barrens our representative bears leaves usually lanceolate, and moderately or densely hairy though usually glabrate in age. On individual barrens it seems to hold its leaf-form with great constancy. This is the plant that has been long known as var. *oblongifolium* but the description of *Cerastium oblongifolium* shows that Torrey had rather some plants collected by Douglass on Lake Erie and by Dewey in western Massachusetts, areas where only forms of "tenuifolium" are known. Dewey's specimen can not be found, but Douglass' plant at the New York Botanical Garden, kindly loaned by Dr. Britton, suggests in width of leaf-blades the Pennsylvania Serpentine plant; yet both in my judgment must have been wide-leaved forms of "tenuifolium." Douglass' plant was young, and I think that as its leaves elongated the shape would have changed to accord with such plants as the specimens of Wolle's from Bethlehem, Pennsylvania, mounted on the same sheet, which clearly shows the narrowed leaf-bases of "tenuifolium." Specimens with leaf-blades wide, but cuneately narrowed at base and relatively slightly hairy, occur occasionally in "tenuifolium" colonies, e.g. on the Nockamixon cliffs of Bucks Co., Pennsylvania; such a state should be counted as merely a form. For it "oblongifolium" can be used, and accordingly I reject that name for the plant of the Serpentine Barrens of Pennsylvania and Maryland.

In Darlington's "Flora Cestrica" 280, 1837, we learn that Dr. Torrey himself had informed the author that specimens from the Pennsylvania Serpentine were not *Cerastium oblongifolium,* thus expressing his early confirmation of the decision reached above. Also in the Academy's Herbarium is preserved a specimen from West Chester, gathered by Darlington in May, 1831, which bears a note stating that Dr. Torrey "thinks it may be a non-descript." Darlington considered the Serpentine plant specifically distinct from *C. tenuifolium* Pursh (which was the natural verdict of any botanist familiar with the plants only in the Pennsylvania Piedmont), and adopted for it the nomen subnudum of Muhlenberg's Catalog of 1815, *C. villosum.* It appears that William Baldwin had sent to Muhlenberg a specimen "from the Barrens, Chester County," which was acknowledged[3] April 8, 1811, with the comment "*A new species,* which I have named *lanatum,*" a name that was evidently changed in the "Catalogus" to "villosum." With a description *Cerastium villosum* Muhl. dates from 1837, but as a species it was clearly antedated by *Cerastium velutinum* Raf., 1808, from "Newcastle County, Delaware and Chester County, Penn." As a variety the reverse is true, *C. arvense velutinum* (Raf.) Britton, 1894, being antedated by *C. arvense villosum* (Muhl.) Hollick and Britton, 1887. Both the descriptions of *C. velutinum* Raf. and *C. villosum* Muhl. emphasize the hairiness so evident at anthesis, and speak of the occurrence of ovate-lanceolate or even ovate leaves, doubtless describing early leaf-blades that would later lengthen to lanceolate. At first I had thought that such descriptions must apply to the extreme wide-leaved and villose plant from the Octoraro gorge to be discussed below, but the statements of occurrence given by both Rafinesque and Darlington lead me to believe that they were describing the prevalent plant of the Pennsylvania Serpentine Barrens; indeed, I have myself visited both the West Chester and Strode's Mill (or Sconnelltown) outcrops cited by Darlington and found only the usual plant, while no other is known from the few Barrens in Newcastle County, Delaware. Specimens, collected by William Darlington at both localities that he cites, do have broadly lanceolate leaf-blades, but both are only in blossom yet with the leaves closely pubescent; surely they would have become early glabrate. Very naturally both botanists emphasized the width of leaf and the hairiness, as they were contrasting the Serpentine plant with *C. tenuifolium* (or *arvense*). Accordingly for the prevalent *Cerastium* of the Serpentine Barrens of southeastern Pennsylvania, and adjacent Delaware and Maryland, I adopt the name of *C. arvense villosum.*

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[3] Darlington, Wm., "Reliquiae Baldwinianae," 26. 1843.

Occasionally foreshadowed on other barrens of southern Chester and southern Lancaster counties, Pennsylvania, but reaching its full development only on the Serpentine close to and on the bluffs of the Octoraro Creek, Chester County, is a form of *Cerastium arvense* so remarkable that it seems necessary to accord it also varietal rank. No botanist, unfamiliar with the geography and geology of the Pennsylvania Piedmont and with the Serpentine plant that has been discussed, would think of associating with *C. arvense* what is now being called its variety *villosissimum.* The leaves are prevailing ovate and permanently softly woolly, while the stems elongate to form clumps of considerable size. It seems to me to embody the extreme development of the tendencies to wider leaf-blades and increased hairiness that distinguish *C. arvense villosum* from "tenuifolium" (for the present accounted true *C. arvense*), and so should be considered as a highly localized derivative of *villosum.* On the Octoraro Serpentine it is associated with the peculiar assemblage of northern species already recounted.

In 1887 Arthur Hollick and N. L. Britton published a comprehensive revision of "*Cerastium arvense* L., and its North American Varieties." This viewed the group broadly and indicated six geographic varieties. Two of these included plants of the Serpentine Barrens of Pennsylvania, var. *oblongifolium* (which also had an extensive extra-Serpentine range) and var. *villosum* (restricted to Serpentine). While the latter plant was defined as "densely villous-pubescent" in contrast to "pubescent," chief emphasis was placed upon its possession of a capsule longer relative to the calyx. Inspection of ample material convinces me that such difference in proportion can not be maintained, while the supposed slight difference in leaf-form is also fluctuating. The denser villous pubescence suggests the state of *villosissimum* but specimens seen that have been named by Hollick and Britton show that their plant was rather the hairier condition of our *villosum.* (Of course the identity of specimens seen by Hollick and Britton can not affect the application of the name "villosum," which depends rather upon its previous use by Darlington.) These two supposed varieties on the Serpentine were carried over into Britton and Brown's "Illustrated Flora," 1897, and Britton's "Manual," 1901, as *oblongifolium* and *velutinum;*

and into Gray's "New Manual," 1908, as *oblongifolium* and *villosum* again. Finally in the second edition of the "Illustrated Flora," 1913, the two varieties were merged under *Cerastium velutinum,* a treatment repeated in Norman Taylor's "Flora of the Vicinity of New York," 1915. I am in accord with this amalgamation so far as our area is concerned, although claiming the plant of the Pennsylvania Serpentine as distinct from wide-leaved forms elsewhere; it is only reluctantly that I accord it the old varietal status under *C. arvense* instead of independent specific rank. Perhaps some time there will be found more convincing characters than those yet postulated. Finally I have added this new second variety that gives a name to the plant of the serpentine bluffs of Octoraro Creek, the most remarkable of all the members of this group.

Leaf-blades narrowly or widely linear, rarely elliptic-lanceolate, usually acuminate or acute at tip and evidently narrowed at base, glabrate or finely pubescent; stem erect most of its length.................. *C. arvense*
(*C. tenuifolium*)
Leaf-blades narrowly lanceolate to ovate, obtuse to acutish at tip, more rounded at base, at anthesis pubescent or villose; stems diffuse, ascending distally.
  Leaf-blades mostly lanceolate, moderately or densely hairy, in age glabrate; stem pubescent or hirsute, prostrate at base so as to form small clumps; plants with dull pubescence............*C. arvense villosum*
  Leaf-blades oblong-lanceolate to ovate, densely and permanently very villous or velutinous, extensively prostrate so as to form clumps often several dm. wide; plants with silver-white pubescence ....*C. arvense villosissimum*

Cerastium arvense Linné.

Cerastium arvense L., Sp. Pl. 438. 1753. "Habitat in Scania & australiori Europa." For the purpose of this study, I accept the current identification of our narrow-leaved plant of the northeastern United States with *C. arvense* of Europe. It is to be hoped that ultimately someone more conversant with the interrelations of Nearctic and Palearctic species will give attention to the problem, however. While they would seem to be specifically identical, there may well prove to be varietal distinctions between the plants on the two sides of the Atlantic Ocean.

(?) *Cerastium pennsylvanicum* Hornem., Hort. Reg. Bot. Hafn. 1: 435. 1813. "Hab in Pennsylvan. . . . intr. 1800." The meagre description might pertain either to the present plant or to var. *villosum;* the description of the leaves as linear-lanceolate makes the former the more probable. Also if the plant had been received from Muhlenberg, as seems quite likely, it is evident that before 1811 he knew only the narrow-leaved plant, "tenuifolium."

Cerastium tenuifolium Pursh, Fl. Amer. Sept. 321. 1814. "On the banks of Schuylkill and Delaware, Pennsylvania. . . . v. v." Type not seen, but description clearly distinctive of a plant represented in Herb. Academy of Natural Sciences of Philadelphia by many specimens from along the Schuylkill and Delaware rivers in southeastern Pennsylvania. If our plant of eastern North America should prove varietally different from *C. arvense* of Europe, this would be the desirable name to adopt.

Cerastium oblongifolium Torr., Fl. Un. St. 460. 1824. "Hab. On mountains in Massachusetts. Dewey. . . . It was first discovered by Prof. Douglass, of West Point, near Sandusky Bay, Lake Erie." The latter is to be considered the type, both because of prior collection and especially prior description by Torrey in American Journal of Science 4: 63, as is stated by him. Evidently the type is a specimen in Herb. Columbia University at the New York Botanical Garden labeled by Torrey "Cass's Expedition, Capt. Douglass"; this consists of two upright stems just coming into blossom with largest leaves about 2 cm. long by 6 mm. wide, while beneath these is a third with leaves similar in length but less than half as wide and bearing Torrey's comment "These specimens seem to connect with *C. arvense.*" The leaves of all are finely hairy and have blades somewhat narrowed to base. As suggested by the lowermost leaves of the upper specimens and all the leaves of the lower one, I think that with further growth during the season the leaf-form would have become relatively narrower and more obviously tapering to the base. The name then can be held only as applicable to a wide-leaved extreme state of *C. arvense*, f. **oblongifolia** (Torr.) Pennell, forma nova. Such plants occur occasionally, especially in the Middle Atlantic and Central States and Ontario, as on the Nockamixon cliffs, Bucks Co., Pa., at Fites Eddy, Lancaster Co., Pa., near Washington, D. C., at Lockport, Ill., at Desoto, Mo., and Amherstburgh, Ont. Dewey's plant mentioned by Torrey can not be located; it must also have been another wide-leaved specimen of *C. arvense,* as a series of specimens from western Massachusetts loaned from the Gray Herbarium have proved to be all true "tenuifolium."

Rocky banks and cliffs, especially along rivers, widespread over eastern North America; nearly throughout the local areas of the Philadelphia and Torrey[4] Botanical Clubs, less frequent on the Coastal Plain, in the Piedmont replaced on Serpentine Barrens by the following varieties.

Cerastium arvense villosum (Muhlenberg) Hollick & Britton.

Cerastium velutinum Raf. in Med. Repos. New York II. 5: 359. 1808. "In Newcastle County, Delaware, and Chester county, Penn." Type not known to exist, but description of leaves as ovate and "tomentous" definitely indicates this variety.

Cerastium villosum Muhl., Catal. Pl. Amer. Sept. 46. 1813. "Pens." (nomen subnudum); Darlington, Flora Cestrica 279. 1837. "Hab.

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[4] The Torrey Botanical Club sponsors at the New York Botanical Garden a Local Herbarium, covering approximately the territory within 100 miles of New York City.

Serpentine rock; W. Chester; Strode's Mill: frequent. . . . It abounds on all our banks of serpentine rock.'' Muhlenberg had received the plant from Baldwin from ''the Barrens, Chester County,'' so its identity with the species described by Darlington is evident. While Darlington's type is to be sought in his herbarium at the State Normal School, West Chester, Pa., a probable isotype, collected by him ''May, 1831, West Chester, Pa.,'' is in Herb. Academy of Natural Sciences of Philadelphia. It is a flowering specimen with broadly lanceolate leaves, reaching 8–9 mm. wide, which are densely and softly, but not heavily, appressed-pubescent, while the oldest leaves are already glabrate. Quite similar is a co-type from ''Strode's Serpentine rock,'' collected May 20, 1829, and which bears the name ''villosum Muhl.'' starred as indicating a new species. I have collected the plant at both these localities, and found it to be the usual plant of Serpentine Barrens.

Cerastium arvense villosum (Muhl.) Holl. & Brit. in Bull. Torrey Bot. Club 14: 49. 1887.

Cerastium arvense velutinum (Raf.) Britt. in Mem. Torrey Bot. Club 5: 150. 1894.

Rocky banks and dry open thin soil, abundant on all Serpentine Barrens of southeastern Pennsylvania and adjacent northern Delaware and northeastern Maryland; also on Serpentine on Staten Island, New York, where it seems to be less marked and is associated with ''tenuifolium.'' For additional discussion of the unity of the prevalent plant of the Pennsylvania Serpentine, and for list of ''barrens'' on which it has been gathered, see my paper in Proc. Acad. Nat. Sci. Phila. 62: 562. 1910. There are many more specimens of this today in the Local Herbarium of the Academy, which would further prove its occurrence on all our ''barrens.'' It seems to be lacking only where replaced by var. *villosissimum.*

Cerastium arvense villosissimum Pennell, var. nov.

Stems widely spreading, those of late summer 3–4 dm. long, densely villose. Leaf-blades ovate or oval, obtuse, the largest 2–3 cm. long, 1 cm. wide, very densely and softly villose, permanently so. (Caespitosum, caulibus late procumbentibus; foliis ovatis ovalibusque, semper villosissimis.)

Type, rocky cliffs, serpentine, along Octoraro Creek below Lees Mill, Chester Co., Pennsylvania, collected in fruit Sept. 21, 1920, F. W. Pennell 10767; in Herb. Academy of Natural Sciences of Philadelphia.

Rocky serpentine slopes, along Octoraro Creek in southwestern Chester County, Pennsylvania; apparently restricted to this small portion of the Nottingham Serpentine Barrens. Occurs over the Barren eastward toward Goat Hill, where it intergrades toward var. *villosum*. On June 22, 1929, some hours' search showed only this variety on the Octoraro cliffs and adjoining hilltop, but a half-mile back occurred transition to *villosum*, while that variety nearly approached the creek down a side stream-valley.

II. THALICTRUM REVOLUTUM DC.

This is frequent on the Serpentine Barrens of southeastern Pennsylvania, and may be recognized by the waxy globules on the under surface of the leaf-blades and the strong heavy odor. Occasionally, however, occur colonies of plants on which the wax deposits are extremely minute or lacking altogether. These are inodorous, thus indicating that the usual odor is produced by the wax. Such plants also wholly lack the puberulence normally present on the petioles and petiolules, thus being quite glabrous throughout. I fail to discover other correlated characters nor any distinct range for these smooth plants, but think that they may well be considered as:

Forma **glabra** Pennell, n.f. Leaves throughout wholly glabrous (Foliis omnino glabris).

Type, serpentine, Nottingham Barrens, Chester Co., Pennsylvania, collected in flower June 30, 1914, F. W. Pennell 1543; in Herb. Academy of Natural Sciences of Philadelphia.

Also collected in fruit Sept. 14, 1916, on serpentine, Nottingham Barrens, Pennell 8956. A fruiting collection made on serpentine along Octoraro Creek below Lee's Bridge, Chester Co., a locality also on the Nottingham Barrens, Sept. 21, 1920, F. W. Pennell 10956, shows intergradation to the species, the leaves being either finely glandular or glabrous beneath. One plant shows both states, the lower leaves being glabrous while the upper younger leaves are glandular.

Also seen from serpentine, Williamson School, Delaware Co., Pennsylvania, collected July 1, 1909, by Bayard Long.

III. VIOLA SAGITTATA AIT. AND V. FIMBRIATULA SMITH.

Some temerity is required for opening again a difficult problem that has been supposed to be well settled, but perhaps an account of the peculiar violet which grows on our Serpentine Barrens may be offered as an excuse. On all the outcrops occurs an especially attractive sort with heavily bearded violet flowers, a trim plant with long petioles that raise vertically the narrow, conspicuously sagittate leaf-blades. As a boy in the late nineties I learned that this was *Viola sagittata,* but with acquaintance with the "Illustrated Flora" and Britton's "Manual," I decided that it must be *V. fimbriatula* inasmuch as it is all but invariably clothed with a fine down of hairs. Later I came to know true *V. fimbriatula* as it grows on other soils in Delaware and Chester counties, Pennsylvania, notably on the Mica-schist hills, and I could not believe that this uniform plant of the Serpentine could be the same as that species with its shorter peduncles, and especially with its spreading, wide, almost coarsely hairy leaf-blades, crenate or hardly toothed at base, and above all so thick and deep lustrous green. The leaves of the Serpentine plant are pale green, often whitened by the sheen of pubescence, or somewhat purplish. In 1910 specimens from the Williamson School barren were submitted to the late Professor Ezra Brainerd, who informed me of their identity with the western hairy plant that had been described as *V. subsagittata* Greene, and remarked: "Your plant and that of the west cannot properly be considered a hybrid, as it is stable and widespread; but we may reasonably suppose it has resulted from the intermingling of these two species (*V. sagittata* and *V. fimbriatula*) in the past, perhaps in the remote past."[5] So, debating as to which name to apply to a plant that "has the leaf-outline of *V. sagittata* and the pubescence of *V. fimbriatula,*" I recorded it as "Viola fimbriatula" on page 569 of my "Flora of the Conowingo Barrens of southeastern Pennsylvania," in January, 1911. But I did call attention to the uniformity of the Serpentine plant and express my disbelief in the idea of "direct or recent hybridism," "as neither *V. fimbriatula* Sm. nor *V. sagittata* Ait., occur, except sparingly, in this district."

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[5] See also comment by Brainerd in American Naturalist **44**: 233. 1910.

During the years since that comment was made the Serpentine plant has been collected by many Philadelphia botanists and always filed in the Local Herbarium of the Academy as "V. fimbriatula." But a doubt has long been dwelling in the mind of the Herbarium's Curator, Mr. Long, a doubt that I have fully shared. Constantly hairy as the plant is, it has neither the habit nor the aspect of *V. fimbriatula.* Finally I have again reviewed the problem, with a great wealth of material at my disposal. Ignoring pubescence, and putting to one side the plants with *fimbriatula* characters—spreading, ovate, crenate leaf-blades, not or jaggedly toothed at base, peduncles shorter than the mature leaves, and capsule usually large; and to the other side plants of *sagittata* characters—erect, lanceolate or narrowly ovate, serrulate leaf-blades ultimately hastately lobed at base, peduncles often equaling or longer than the leaves, and capsules mostly smaller—it has been possible to make a nearly complete separation of our specimens. *V. fimbriatula* is a plant of sandy and sterile soil, occurring especially on shale ridges in southeastern Pennsylvania; while *V. sagittata* occurs through the Coastal Plain of southern New Jersey, and somewhat in southeastern Pennsylvania where on the Serpentine Barrens it is a constantly present species. In view of the uniformity of both these species as so associated, I am less than ever inclined to believe that the one character of pubescence on the Serpentine plant indicates that it has had a hybrid origin. Rather I note with interest that *V. fimbriatula* also occurs in both glabrous and hairy states. We have overstressed pubescence in distinguishing these violets.

In the "Flora Cestrica" of 1837, the closest taxonomic study ever made of a portion of the Pennsylvania Piedmont, William Darlington perfectly distinguished *V. fimbriatula* (as *V. ovata* Nutt.) and *V. sagittata,* describing the latter as mostly pubescent. He also understood their difference in local distribution; while assigning both to the Mica-slate, he placed only *V. sagittata* on the Serpentine. In his later edition, 1853, with the deference of his own acute field-knowledge to the herbarium-study of Torrey and Gray, we find both merged under *V. sagittata* with the observation: "The *V. ovata, Nutt, & Fl. Cestr. ed.* 2. is now considered as nothing more than a *variety* of this." A sad deterioration marks the last edition of the "Flora Cestrica" from its splendid predecessor; it is scarcely believable that one of Darlington's ability should have so wholly effaced his own judgment on this and many other local problems.

It is a simple matter to apply the name *Viola fimbriatula;* Sir James E. Smith's description published in 1817 is distinctive and traces to Pursh's error in supposing that this blue-flowered hairy plant of dry hills was *V. primulifolia* L. A year later, wholly unaware of Smith's action, Thomas Nuttall published *V. ovata* with the same reference to Pursh but with good field-knowledge of the plant himself. Since its double launching the species has long been recognized as a characteristic plant of the northeastern United States, although for most of the latter half of the nineteenth century its identity was submerged in *V. sagittata.* Glabrous states are so rare and sporadic in *V. fimbriatula,* that they merit no higher rank than that of "forma."

Before determining the historic application of the name "sagittata," it is necessary to decide the status of its pubescent and glabrous states. Structurally they are of no more significance than in *V. fimbriatula,* for pubescence seems wholly uncorrelated with any other character. If one condition occurred only sporadically, it would also be considered as logically merely a "forma," but if there proved to be environmental or geographical difference between the two states of *Viola sagittata* then in my opinion they should be accounted varieties or "geographic subspecies." Reviewing the specimens in the Academy's Local Herbarium from the Coastal Plain of southern New Jersey we note that they are mostly glabrous, occasionally showing, however, a slight development of hairs, especially early in the season. Turning to the Piedmont of southeastern Pennsylvania we find similar glabrate or glabrous specimens, with similar occasional development of a slight pubescence in plants growing locally in moist sandy or clayey soil, environment much like the moist sandy soil preferred in the Coastal Plain. But on drier soils of the Piedmont, and universally on open serpentine slopes, occurs a more strongly pubescent development, having a soft coating of hairs most pronounced in the spring but persisting in some degree throughout the season. Transition between glabrous and hairy states seems too complete to warrant specific rank, but the geographic and ecologic differentiation seems to me sufficiently pronounced to warrant our considering them as of varietal distinctness.

It is evident that Professor Brainerd and all recent botanists have considered the glabrous plant the true *Viola sagittata,* doubtless impelled by the fact that it offers most complete contrast with the usual state of *V. fimbriatula.* Such could not fail to be the opinion of any one who could consider the hairy plant of the Serpentine as being intermediate between the two species, a view that I now believe has no structural warrant. Assuming the right of either the glabrous or the pubescent state to have been the original "sagittata," let us consult the older descriptions. *Viola sagittata* was a "Nat[ive] of Pennsylvania," "introd[uced] 1775, by John Fothergill, M.D." to England, and grown at Kew Gardens where it was described in Aiton's "Hortus Kewensis" in 1789. The description tells us that the leaves were "subpubescentia," the petioles "pilosiusculi," and the scapes "villis raris adspersi," all indicating the presence of a slight or moderate degree of pubescence. A later description[6] by that careful British botanist, Sir James E. Smith, who likely knew the plant both in the herbarium and in cultivation, commences with the word "downy," an apt term for the pubescent plant of the Serpentine. Pursh, who reviewed carefully the older collections and who probably also knew the pubescent plant growing near Philadelphia (where it still occurs within the present city limits), in his "Flora Americae Septentrionalis" commences his description of *V. sagittata* with the word "pubescens." Thus from the early descriptions there seems reason to suppose that it was the pubescent plant that was introduced to England by Dr. Fothergill, a suspicion fully confirmed by my inspection this past summer of the specimen from "Hort. Fothergill (ex America, Pennsylvania)," still preserved at the British Museum. The source seems probable from our knowledge of the fact that in August, 1775, the English physician wrote[7] to his friend (and fellow Friend) Humphry Marshall acknowledging the receipt of "a box of plants, amongst which are some new Ferns, and a few other rare plants." We cannot prove that *Viola sagittata* was in this box or any of its immediate predecessors, but the likelihood of its being so transmitted is exceedingly great when we recall that Humphry Marshall lived and formed his Botanic Garden at Marshallton while only a mile east of that village the pubescent state of the species grows on an outcrop of serpentine. The Academy's Local Herbarium possesses specimens of it gathered there on September 29, 1908, and May 6, 1909, by Mr. Bayard Long. We may be sure that typical *Viola sagittata* is the hairy plant of the Pennsylvania Serpentine.

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[6] Rees Cyclopedia 38: n. 5. 1817.

For the glabrous plant characteristic of the Coastal Plain I know of no certain varietal or subspecific name. In 1814 Pursh described *Viola dentata,* which was held to be "a mere variety of *V. sagittata*" by Nuttall when in 1818 he proposed his own wider-leaved variety *emarginata.* Pursh described the leaves as oblong as in *V. sagittata,* but the peduncles as shorter than the leaves, a detail which more frequently applies to Nuttall's variety which in 1828 was raised to specific rank as *V. emarginata* (Nutt.) LeConte.[8] The leaf-blades were also described as "inferne subhastato-grandi-dentatis" as compared with "basi incisis" for *V. sagittata;* such large toothing would again favor the interpretation of the plant as *V. emarginata.* Without finally deciding whether Pursh's name should supersede LeConte's, as is suggested by the latter's frank inclusion of *V. dentata* as a synonym of his new species, I incline to reject *dentata* (with the combination *V. sagittata dentata* (Pursh) DC., Prod. **1**: 294. 1824) as designating the glabrous variety of *V. sagittata* Ait. Also, because we are fortunately freed from the necessity of adopting older names from other categories, we need not investigate Greene's and others' many recent specific proposals. I suggest for the glabrous plant that has so long passed as true *Viola sagittata* the appropriate varietal name of "glabra."

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[7] Memorials of Bartram and Marshall, 513. 1849.

[8] In Ann. Lyc. N. York. 2: 142. 1828.

Leaves spreading, the blades ovate, crenate, not or slightly coarsely toothed at base, obtuse to acutish, usually roughish-pubescent, from half to equaling or often longer than the petioles; peduncles in anthesis scarcely or not longer than the leaves; petals relatively wide, the posterior beardless, the lip obovoid, over half as wide as long, heavily reticulate-veined; capsule mostly 9–12 mm. long .... *V. fimbriatula*

Leaves erect-ascending, the blades lanceolate or narrowly ovate, crenate-serrulate, often obscurely so, when mature strongly toothed or several-lobed at base, finely pubescent or glabrous, usually from ¼ to ½ the length of the petioles; peduncles in anthesis longer than the leaves; petals narrower, frequently or usually all bearded, the lip cuneate-oblong, less than or about half as wide as long, more faintly veined; capsule mostly 7–10 mm., but occasionally reaching 14 mm. long.

Foliage pubescent, only in age tending toward glabrate. *V. sagittata*

Foliage glabrous, or slightly pubescent when young. *V. sagittata glabra*

Viola fimbriatula J. E. Smith.

Viola fimbriatula Sm. in Rees Cyclop. 37: n. 16. 1817. "Sent from North America by Dr. Francis Boott as the *V. primulifolia* of Pursh, with whose definition it agrees. That author speaks of it as growing on dry hills from Canada to Virginia." Description distinctive.

Viola ovata Nutt., Gen. N. Amer. Pl. **1**: 148. 1818. "*V. primulifolia,* of Pursh, not of Linnaeus. On dry hills as correctly remarked by Mr. Pursh. . . . Abundant near Philadelphia on the shelving rocks which border the Schuylkill and also in the sandy fields of New Jersey." No type found in Herb. Academy of Natural Sciences of Philadelphia. Description distinctive, an independent characterization of the last.

Viola sagittata ovata (Nutt.) Torr. & Gray, Fl. N. Amer. **1**: 138. 1838.

Sandy or gravelly soil, Nova Scotia to North Carolina.

Especially characteristic of shale and sandstone ridges in the southeastern Appalachians of Pennsylvania.

Forma glabrata Pennell, forma nova. Leaf-blades mostly nearly or quite glabrous, only when young somewhat pubescent (Foliis maturis glabratis).

Type, open roadside, south slope of Kittatinny Mountains, about 2¼ miles N.W. by W. of Slatedale, Lehigh County, Pennsylvania, collected in flower April 26, 1925, by Harold W. Pretz 12486; in Herb. Academy of Natural Sciences of Pennsylvania.

A glabrous extreme probably occurring with the species. Seen only from Northampton, Lehigh and Berks Counties, Pennsylvania.

Viola sagittata Aiton.

Viola sagittata Ait., Hort. Kew. 3: 287. 1789. ''Nat. of Pennsylvania. Introd. 1775, by John Fothergill, M.D.'' Specimen probably from Humphry Marshall, who likely obtained it on the Serpentine Barren just east of Marshallton, Chester Co., Pennsylvania. Type, from ''Hort. Fothergill (ex America, Pennsylvania),'' seen in British Museum of Natural History, London, England.

Viola sagittaefolia Salisb. Prod. 130. 1796. Name doubtless substituted for ''sagittata'' because more exactly descriptive.

Open dry slopes, often sandy, through much of the eastern United States, passing imperceptibly into the following more wide-ranging variety. This is the prevalent state in the Piedmont, as on the Serpentine Barrens of southeastern Pennsylvania, and doubtless generally through the Appalachian area. Perhaps identical with *V. subsagittata* Greene of the western Prairie region.

Viola sagittata glabra Pennell, var. nov.

Plant glabrous, or only slightly pubescent on the young growth (Fere vel omnino glabra).

Moist soil, sandy or clayey, Massachusetts to South Carolina, Illinois and Louisiana.

Type, roadside thickets, southwest of Alloway, Salem County, New Jersey, collected in flower April 22, 1910, by Bayard Long, No. 3034, in Herb. Academy of Natural Sciences of Philadelphia.

Doubtless this often occurs as a mere glabrate form among colonies of the hairier *sagittata,* but apparently the glabrous state is more prevalent on the Coastal Plain and has a larger total range. Apparently passes also into the wider-leaved *V. emarginata* (Nutt.) LeConte which occurs from Massachusetts to North Carolina and has nearly the same range in the Philadelphia area, both occurring on the Coastal Plain, scattered through the Piedmont, and becoming more frequent again on the lower Appalachian ridges.

IV. SENECIO SMALLII BRITTON.

In Britton's "Manual" (1901) and in Gray's "New Manual" (1908) this relative of *S. balsamitae* Muhl. is accounted southern, the northern limit of distribution being given as "Virginia." But in Taylor's "Flora of the Vicinity of New York" (1915) the species appears as occurring in "PA. Serpentine Barrens, Delaware County." Such an extension of range to my native county and based upon a specimen from the Serpentine, challenged attention. Study of the many specimens from southeastern Pennsylvania in the Local Herbarium of the Academy fully sustains the record of Taylor's "Flora," and reveals an interesting local distribution. *Senecio smallii* occurs on all our Serpentine Barrens, and only rarely on other soils where Mr. Hugh E. Stone has gathered it in Chester County, away from serpentine, at Chadds Ford, Coatesville, and "Bonsall School" in West Caln Twp. But *Senecio pauperculus balsamitae* (Muhl.) Fernald grows always on other soils, every specimen from the Serpentine that has been so named proving to be *S. smallii.*

To realize this precise distribution it has been necessary to formulate anew the distinctions between these species, but with a nearer approach to the characters given by Dr. Britton in his "Manual" than to those used by Dr. Greenman in the "New Gray." They appear to be distinguished as follows:

Heads usually 8–10 mm. high, the disk-flowers considerably exceeding the involucre, the rays about 10 mm. long; heads mostly on firm, strongly ascending peduncles in a corymb that is often loose; basal leaf-blades prevailing oblong and obtuse......... *S. pauperculus balsamitae*

Heads usually 5–7 mm. high, the disk-flowers scarcely exceeding the involucre, the rays about 7 mm. long; heads mostly on slender, more spreading peduncles in a compact corymb; basal leaf-blades prevailing elliptic or oblong-elliptic, acutish or obtuse.................................. *S. smallii*

Senecio pauperculus balsamitae (Muhlenberg) Fernald.

Senecio balsamitae Muhl.; Willd., cur. L., Spec. Plant. 3: 1998. 1800. ''Habitat in America boreali.'' Type, probably from near Lancaster, Pennsylvania, and now at Berlin, Germany, should be verified as the imperfect specimen bearing this name in Muhlenberg's Herbarium seems to be rather *S. smallii.* But the description of the radical leaves as oblong, obtuse, and the heads as on long peduncles, would describe better the plant now considered, which is also present among Muhlenberg's collections.

Senecio pauperculus balsamitae (Muhl.) Fernald in Rhodora 23: 299. 1921.

Meadows and rocky woodlands, Nova Scotia to Minnesota, south along the Appalachians to North Carolina. In the Philadelphia Local Area this occurs in the following counties:

PENNSYLVANIA: Northampton, Lehigh, Bucks, Montgomery, Delaware and Chester counties.

DELAWARE: Newcastle County.

In deference to his acquaintance with these plants in the field, I follow Professor Fernald in distinguishing ours only varietally. *S. pauperculus* Michx. (Fl. Bor. Amer. 2: 120. 1803), from ''Canada, juxta lacus,'' describes a smaller plant than ours, with narrower, less cut stem-leaves and fewer heads; structurally it is evidently a northern depauperate derivative of *balsamitae.* It is represented in the Academy's Herbarium by specimens from Newfoundland to Vermont and Michigan, including one labeled ''No. 48. . . . Michaux in Amer.,'' which, however, fails to bear his specific name.

Senecio smallii Britton.

Senecio aureus angustifolius Britton in Mem. Torrey Bot. Club 2: 39. 1890. '' 'The Pass,' between Buchanan and Peaks of Otter collected by A. M. Vail, June 6 [1890].'' Description distinctive. A collection made just two years later by Dr. and Mrs. Britton and Miss Vail at Marion, Smyth County, is in the Academy's Herbarium.

Senecio smallii Britton, l.c. 4: 132. 1893. Based on *S. aureus angustifolius* Britton, but citing also the collection just mentioned.

Grassy openings in forest, Serpentine Barrens, etc., southeastern Pennsylvania to Georgia and apparently Illinois. In the Philadelphia Local Area, seen from the following counties:

PENNSYLVANIA: Montgomery, Delaware, Chester and Lancaster counties.
DELAWARE: Newcastle County.
MARYLAND: Cecil County.

V. LACTUCA CANADENSIS LINNÉ.

In a study[9] of our wild yellow lettuce, Professor Karl M. Wiegand has made for the first time a clear distinction between northern and southern types of *Lactuca canadensis*. The characters used by him are applicable only to cut-leaved forms, for they depend wholly upon the shape of the segments of the leaf. Nevertheless the differences seem to be valid, and, accepting his identification of Kalm's original collection as being likely the northern plant, we may contrast the two varieties as follows:

Lobes of the leaf-blades lanceolate or linear, usually entire. *L. canadensis*
Lobes of the leaf-blades ovate, usually obliquely angled and dentate on the distal side .... *L. c. latifolia*

It is the latter plant, *Lactuca canadensis latifolia* Kuntze,[10] that is so familiar as an abundant weed over much of the southeastern and mid-eastern United States. Throughout the Philadelphia area it is nearly ubiquitous in cultivated or waste fields and along roadsides. Once Rafinesque[11] gave it the apt name of *Lactuca angulata,* and a specimen so named by him is in the Herbarium of the Academy of Natural Sciences. With its characteristic leaf-shape the plant seems to extend north along the Atlantic Coast only to eastern Massachusetts, while states transitional to the species occur farther northward.

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[9] "Variations in *Lactuca canadensis*" in Rhodora 22: 9–11. 1920.
[10] Revisio Generum Plantarum 1: 349. 1891.
[11] New Flora of North America 4: 83. 1838.

The species, true *Lactuca canadensis* L., is much less widespread; its distribution, as shown by Professor Wiegand, is especially through the St. Lawrence valley and northern New England, but specimens in the Academy's Herbarium warrant us in extending the range southward along the Appalachians to North Carolina. In the Piedmont of southeastern Pennsylvania it is an occasional plant of rocky woodlands. Our Local Herbarium shows it from Northampton (Easton and Hellertown), Bucks (Sellersville), Philadelphia (Byberry), Delaware (St. Davids) and Chester (Lees Bridge) counties. Of these stations the last, on the Serpentine near the Octoraro Creek, is of especial interest; as recounted in my introductory remarks, it there occurs with a considerable assemblage of northern species.

Probably true *Lactuca canadensis* occurs also in Lancaster County, as, more than a century ago, Muhlenberg had distinguished it from the locally abundant "latifolia" which he had naturally assumed to be the species of Linnaeus. Muhlenberg's name, *Lactuca elongata,* well characterizes the slender tapering leaf-segments. A specimen of his collecting reached Germany, where in 1804 the name was published by Willdenow[12] with merely the locality "Pensylvania." If science were but free to choose the technical names most fitting, how gladly would we adopt for this plant the term "elongata" and for our ordinary variety of the species that of "angulata!"

But the nomenclature of these wild lettuces promises to prove quite complicated. There are more old names than those mentioned by Professor Wiegand, while a difficult taxonomic problem is involved in deciding the actual relationship between forms with lobed and unlobed leaves. If observations made this past summer can be trusted, both these conditions occur habitually in the same colonies with numerous intergradations; if these should prove to be merely individual states of the same varieties, then priority will bring some other name to the fore in place of "latifolia." The group needs further study, as the plants grow in nature, and possibly also by genetical methods.

[12] *Cur.* L., Spec. Plant. 3: 1525. 1804.

The Eastern Short-styled Phloxes[1]

EDGAR T. WHERRY

In last year's number of "Bartonia"[2] the Phloxes of the section *Subulatae* were discussed as to their history, geography, ecology, variation, and cultivation. The second section to be treated in like manner is that termed by Peter[3] the *Divaricatae.* Its members differ from those of the former section in that the stems are scarcely if at all woody, the leaves are fewer, larger, and less persistent, and the inflorescence is a more compound cyme of short-pedicelled flowers; in these the sepals are united for $\frac{1}{3}$ to $\frac{1}{2}$ their length, and the stamens and styles are much shorter than the corolla-tube. The western species included in the section by Peter are not treated here, but four eastern ones are recognized. In the following synopsis these are arranged in the order of increasing compactness of inflorescence:

PHLOX, SECTION DIVARICATAE: KEY TO SPECIES

Sterile shoots becoming decumbent, often rooting at nodes; leaves rather broad, obtusish to acutish; inflorescence lax, glandular; calyx-lobes short-awned; corolla-tube always glabrous, lobes sometimes notched, and limb pale violet, ranging to purple or to white..............4. *P. divaricata*

Sterile shoots erect or decumbent, not rooting at nodes; leaves mostly narrow; inflorescence compact; corolla-tube sometimes pubescent, lobes never notched, and limb purple, ranging to violet or to white.

  Leaves linear to lanceolate, or some nearly ovate, acuminate, sparingly if at all persistent; bracts spreading, scattered through the moderately compact cyme; inflorescence-hairs fine or exceptionally coarse, sometimes gland-tipped, rarely lacking; calyx-awns often long.

    Nodes few; leaves pubescent or sometimes glabrous, the upper spreading, passing rather abruptly into bracts.........5. *P. pilosa*

    Nodes numerous; leaves always glabrous, the upper ascending, passing gradually into glandular bracts....................6. *P. floridana*

  Leaves oblong-elliptic or sometimes lanceolate, obtusish to acuminate, many of them persistent; bracts ascending, closely surrounding the decidedly compact cyme; inflorescence-hairs coarse, never gland-tipped; calyx-awns short.......................................7. *P. amoena*

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[1] Presented in abstract, with lantern-slide illustrations, at the meeting of the Philadelphia Botanical Club on December 19, 1929. Contribution from the Botanical Laboratory of the University of Pennsylvania.

[2] Bartonia 11: 5. 1929.

[3] In Engler & Prantl's Pflanzenfamilien 4^{3a}: 47. 1891.

4. **Phlox divaricata** Linné. Blue Phlox. Plate 1.

History.—This species, like several others, was discovered in early colonial days, being listed in 1700 by Plukenet[1] as "Lychnidea *Virginiana* Blattariae accedens, Alsines aquaticae foliis, floribus summo caule brachiatis, sive in ramulos divaricatis." In 1739 John Bartram, the pioneer American botanist, collected it along the Susquehanna River in Pennsylvania, and sent it to Peter Collinson, who catalogued it, according to Dillwyn,[2] as "Lychnidea foliis lanceolatis obtusis, flore pallide caeruleo." The specimen on which Linné[3] founded the species in 1753 bears on the sheet the initials "H.U."[4] signifying that it represented a plant being cultivated in the botanical garden at Upsala (Hortus Upsaliensis). His description contains the erroneous statement that the lower leaves are alternate, but is otherwise applicable. The corolla-lobes in the type specimen are conspicuously notched, although in the earliest known illustration of the species, that published by Miller[5] in 1760, the notches in the lobes are much shallower, indicating that material had already reached Europe from more than one source.

In 1796 Salisbury[6] applied the name *Phlox vernalis* to what was probably the same species, but gave no description. Thirty years later a supposedly distinct plant was described by Sweet[7] as *P. canadensis,* and this name has been considerably used in horticultural writings, although most botanists have recognized the differences from the Linnean plant—more upright habit and lobes "about half the length of *P. divaricata* and much broader"—to be insufficient to constitute a separate species. Two other names, *P. amplexicaulis* Rafinesque and *P. glutinosa* Buckley, have been regarded by some authors as synonyms of *P. divaricata,* but are here discussed in connection with *P. pilosa.*

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[1] Mantissa 121. 1700.

[2] Hortus Collinsonianus 39. 1843.

[3] Species Plantarum (1): 152. 1753.

[4] As shown in a photograph kindly obtained in 1928 by Dr. William R. Maxon of the U. S. National Herbarium.

[5] Figs. Plants Miller's Gardeners' Dict. 2: pl. 205, fig. 1. 1760.

[6] Prodromus stirpium, etc. 123. 1796.

[7] British Flower Garden 3: pl. 221. 1827.

When explorations came to be made in the Mississippi basin, the *Phlox divaricata* occurring there was found to differ somewhat from that farther east, and attempts were made to recognize this by special nomenclature. In enumerating plants observed in Arkansas territory, Nuttall[1] included a "*P. glomerata,*" with a star to indicate that he regarded it as a new species, but as he furnished no description the name lacks validity. A specimen from his original collection, preserved in the Gray Herbarium, is an immature individual of the common representative of *P. divaricata* in that region, which is characterized by having entire corolla-lobes. The same thing was collected by Lapham in Wisconsin, and named by Wood[2] *P. divaricata* β ? *laphami,* with the description "*Lvs.* ovate; *pet.* obtuse, entire. . . . Intermediate between *P. divaricata* and *P. glaberrima,* and may prove distinct from both." Gray[3] modified Wood's designation to variety *laphamii;* and many years later, Clute[4] held the difference in corolla-lobe outline to justify the recognition of two distinct species, applying to the western one the name *P. laphamii.* To what extent these different interpretations correspond to the existing relationships will be considered after the variations shown by *P. divaricata* have been described.

Whitish variants occasionally appear in all large colonies of the Blue Phlox, and the names "P. divaricata alba," "P. canadensis alba," and even "P. laphami alba" have long been in use for such material by horticulturists, although none of these combinations appear to have been validated by formal publication. In 1920 Farwell[5] proposed *P. d.* forma *albiflora* for a plant from Michigan, while a few years later House[6] applied the same term to a New York occurrence. Farwell[7] subsequently furnished data to show that a pallid rather than a complete albino color-form was represented. These and other forms will be discussed under Variation.

[1] Trans. Amer. Phil. Soc. 5: 196. 1837.
[2] Class-book of Botany 439. 1846.
[3] Manual of Botany, ed. 2. 331. 1856.
[4] Amer. Botanist 25: 101. 1918.
[5] Rept. Mich. Acad. Sci. 31: 369. 1920.
[6] Ann. List Ferns & Flg. Plants N. Y. 581. 1924.
[7] Amer. Midl. Nat. 11: 68. 1928.

Geography.—*Phlox divaricata* is one of the most wide-ranging of all the species, occurring in various physiographic provinces, though rarely in the Coastal Plain and Piedmont, from western Florida to eastern Texas, southern Minnesota, and southernmost Quebec. This is shown graphically in figure 1 by circles representing the counties in which it is known to have been collected. The terminal moraine of the final (Wisconsin) glacial stage, marked by a dotted line, has evidently been ineffective as a barrier; but the mountain front (row of ʌs) and the Fall-line (cross-hatched band) have clearly restricted its migration, and it has crossed them only along a few river valleys. Curving southward from the lower end of Lake Michigan to the coast of Georgia runs a boundary between an eastern and a western variety; the significance of its course remains to be explained.

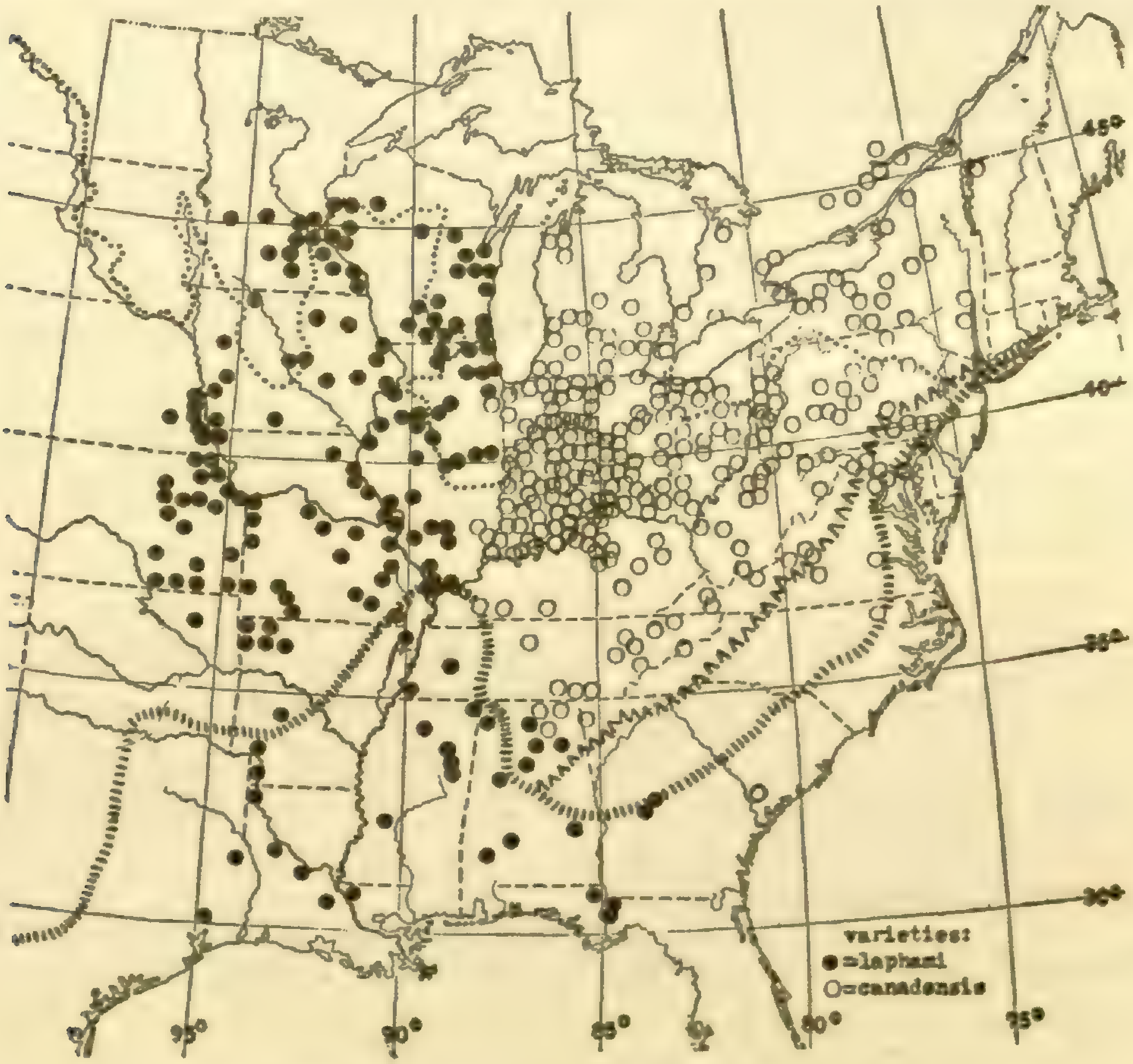

FIG. 1. Distribution of *Phlox divaricata*.

ALABAMA: Rather frequent in the upland regions, and rare in the Coastal Plain, being recorded from Blount′, Bullock, Clarke, Etowah′, Franklin, Jackson′, Jefferson′, Madison′, Marshall′, Morgan′, Tuscaloosa, and Wilcox′ counties. The boundary between the areas of the eastern and western varieties crosses the northeast corner.

ARKANSAS: Occasional throughout, specimens having been seen from Benton, Carroll′, Garland, Hempstead, Madison′, Miller, Newton′, and Washington counties. Nuttall's "*P. glomerata*" was ascribed to this state.

DISTRICT OF COLUMBIA′: Found only on alluvial flats of the Potomac River in the Piedmont province, toward the northwest boundary.

FLORIDA: Limited to the northwestern part of the state, where it grows along the Apalachicola and Chipola rivers in Gadsden, Jackson′, and Liberty′ counties.

GEORGIA: Rare, specimens having been seen only from the Coosa valley in Floyd and the Ocmulgee valley in Bibb and Houston counties.

ILLINOIS: Abundant practically throughout, and recorded from 36 counties: Calhoun, Champaign, Clinton′, Cook, Du Page, Hancock, Henderson, Jackson′, Jefferson, Johnson, Kane, Kankakee, Knox, Lake′, La Salle, Macon, Macoupin, Marion, Marshall, McHenry, McLean, Menard, Ogle, Peoria, Piatt, Pulaski′, Richland, Rock Island, St. Clair, Stark, Tazewell′, Union′, Vermilion, Wabash, Will, and Winnebago. The boundary between the varieties runs near the eastern edge of the state.

INDIANA: Known in nearly every county, largely as the result of the collecting activity of Charles C. Deam; this does not mean that it is more frequent here than in adjacent states, but merely that they have been less thoroughly covered. The list is: Adams, Allen, Blackford, Brown, Carroll, Cass, Clark, Clay, Clinton, Crawford, Daviess, Dearborn, Decatur, De Kalb, Delaware, Dubois, Elkhart, Fayette, Fountain, Franklin, Fulton, Gibson, Grant, Greene, Hamilton, Hancock, Harrison, Howard, Huntington, Jackson, Jay, Jefferson,

′ **Designates counties from which fresh material has been seen.**

Jennings, Johnson, Knox, Kosciusko, Lagrange, Lake, Laporte, Lawrence, Madison, Marion, Marshall, Miami, Monroe, Montgomery, Morgan, Newton, Noble, Ohio, Orange, Owen, Parke, Perry′, Porter, Posey, Putnam, Randolph, Ripley, Rush, St. Joseph, Scott, Shelby, Spencer′, Steuben, Sullivan, Switzerland, Tippecanoe, Vanderburg, Vermilion, Vigo, Wabash, Warrick, Washington, Wayne, Wells, and White. A variant with reduced, acuminate lobes, the "Crawfordsville form," occurs in Montgomery and Tippecanoe counties.

IOWA: Scattered nearly throughout, specimens having been seen from Decatur, Dubuque, Emmet, Fayette, Floyd, Fremont, Ida, Johnson, Jones, Marshall, Pottawattamie, Poweshiek, Scott, Shelby, and Story counties.

KANSAS: Known from 20 counties toward the eastern end: Atchison, Bourbon, Brown, Butler, Chautauqua, Cherokee, Cowley, Douglas, Geary, Jackson, Leavenworth, Lyon, Montgomery, Morris, Nemaha, Riley, Shawnee, Wabaunsee, Wilson, and Wyandotte. The westernmost reported occurrence of the species is that in Butler County.

KENTUCKY: Extends throughout, although as less collecting has been done here than in the states adjoining on the north, the county list is relatively small: Anderson, Boone′, Christian′, Estill, Fayette, Franklin, Gallatin′, Henry′, Jefferson, Jessamine, Kenton′, Lyon, Mercer, Morgan, Rockcastle, Rowan′, Shelby, and Warren.

LOUISIANA: Recorded from 5 parishes along the Mississippi and Red rivers: Caddo, Feliciana, Natchitoches, Rapides, and St. Landry.

MARYLAND: Known only from the basins of the Potomac and Susquehanna rivers, in Allegany, Anne Arundel, Cecil′, Frederick′, Garrett, and Montgomery′ counties.

MICHIGAN: Throughout the southern half of the lower peninsula, there being records from 19 counties:[1] Allegan′, Benzie, Berrien, Cass, Eaton, Genesee, Grand Traverse, Gratiot, Hillsdale, Ingham, Ionia, Jackson, Kalamazoo, Kent, Oakland, Ottawa, Washtenaw, Wayne, and Wexford.

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[1] Prof. H. T. Darlington kindly furnished data on these from the State College herbarium, where most of them are represented.

MINNESOTA: In the State University herbarium there are 13 counties represented:[1] Chippewa, Dakota, Goodhue, Hennepin, Houston, Le Sueur, Meeker, Nicollet, Olmsted, Ramsey, Scott, Waseca, and Winona. The first is the northwesternmost point the species is known to have reached.

MISSISSIPPI: Occasional in the northern and central parts of the state, being recorded from Chickasaw, Clay, Hinds, Lafayette, Oktibbeha, and Tishomingo counties.

MISSOURI: Wide-spread, specimens having been seen from 25 counties: Atchison, Bates, Butler, Carter, Cass, Christian, Cole, Cooper, Dunklin, Gasconade, Greene, Iron, Jackson, Jasper, Jefferson, Knox, Marion, Phelps, Pike, Ralls, St. Charles, St. Francois, St. Louis′, Shannon, and Taney.

NEBRASKA: Found only in the southeastern corner, the county records being: Cass, Douglas, Lancaster, Nemaha, Otoe, and Sarpy.

[NEW JERSEY: In the herbarium of the Academy of Natural Sciences of Philadelphia there is a specimen labelled Camden, but it is believed to represent cultivated material.]

NEW YORK: Common in the western and central portions, extending to the banks of the Hudson and the western border of the Adirondacks, in the counties: Broome, Cattaraugus, Chemung, Erie, Genesee, Greene, Herkimer, Jefferson, Monroe, Oneida, Onondaga, Ontario, St. Lawrence, Steuben, Tompkins′, Ulster, Wyoming, and Yates.

NORTH CAROLINA: Evidently rare, specimens having been seen only from the valleys of the Roanoke River in Halifax, and the French Broad in Madison counties.

OHIO: Frequent throughout, there being records from 50 counties: Adams′, Auglaize, Butler, Clark, Clermont, Clinton, Columbiana, Coshocton′, Crawford, Cuyahoga, Darke, Delaware′, Erie, Fairfield′, Franklin′, Gallia, Greene, Hamilton′, Hancock, Hardin, Harrison′, Highland′, Huron, Jackson′, Knox, Licking, Lorain, Lucas, Medina, Mercer, Miami, Monroe, Montgomery, Muskingum′, Ottawa, Pike′, Portage, Preble, Richland, Ross′, Sandusky, Seneca, Shelby, Stark, Tuscarawas′, Vinton, Warren, Washington, Williams, Wyandot.

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[1] Thanks are due to Prof. C. O. Rosendahl for sending specimens.

OKLAHOMA: In the Missouri Botanical Garden herbarium there is a specimen from Chelsea, Rogers County.

PENNSYLVANIA: Occurs in all parts of the state, though rare northward, the county list being: Allegheny′, Beaver′, Blair, Bradford, Butler, Cambria′, Center, Chester, Clearfield, Clinton, Dauphin′, Delaware, Erie, Fayette, Huntingdon, Lancaster′, Lawrence, Luzerne, Lycoming′, Mercer, Mifflin′, Union, Venango, Washington, Westmoreland, York.

SOUTH CAROLINA: In 1817 Elliott[1] reported this species with a question from swamps of the Savannah River 40 miles above Savannah, which would place it in Hampton County, South Carolina. In his herbarium, preserved at the Charleston Museum, a typical specimen of it is included, although it is mounted along with a fragment of *P. glaberrima*, and his doubt was evidently due to his confusing the two species.

TENNESSEE: As little collecting has been done here, there are records only from Anderson, Blount, Davidson, Franklin, Grainger′, Hamilton′, Hawkins′, Knox′, Madison, Marion′, Roane, and Shelby counties. The Madison and Shelby specimens represent the western variety.

TEXAS: Herbaria include specimens from Liberty and San Augustine counties, near the eastern edge.

VERMONT: Reported from Sheldon, Franklin County.[2]

VIRGINIA: Apparently rather rare, and known from but 9 counties: Amherst′, Botetourt′, Campbell, Chesterfield′, Fairfax′, Giles′, Rockbridge′, Russell, and Washington.

WEST VIRGINIA: Scattered throughout, except in the higher mountains, in the counties: Cabell, Doddridge, Fayette′, Gilmer, Hardy, Harrison, Jefferson′, Kanawha, Lewis, Marion, Mercer, Monongalia, and Ohio.

WISCONSIN:[3] Rather common below latitude 45° 30′, the county list being: Barron, Brown, Calumet, Columbia, Dane, Dunn, Green, Iowa, Jefferson, Manitowoc, Marathon, Milwaukee, Outagamie, Pepin, Pierce, Polk, Racine, Rock, Rusk, Sauk, Shawano, Sheboygan, and Winnebago.

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[1] Sketch Botany S. C. & Ga. 1: 248. [1817.]

[2] Vt. Agr. Expt. Sta. Bull. 187: 237. 1915.

[3] Data for this state were supplied by Mr. A. M. Fuller of the Milwaukee Public Museum.

CANADA.[1] ONTARIO: Frequent between Lake Huron and the St. Lawrence, being known in 14 counties: Carleton, Elgin, Essex, Frontenac, Grey′, Hastings, Huron, Lambton, Lanark, Lincoln, Peel, Russell, Welland, and York.

QUEBEC: The original "*Phlox canadensis*" was from Montreal, Hochelaga County, this being the northeasternmost point *P. divaricata* is known to have reached. There is also a report from the Ottawa valley in Hull County.

Ecology.—*Phlox divaricata* is typically a rich woods plant, growing on alluvial flats, on ravine slopes, and to some extent on rock ledges, especially when these are calcareous. The soil may be sandy or clayey, and is usually well supplied with humus; in reaction it is normally circumneutral. Though appearing in various successional stages, this *Phlox* is most characteristic of climax associations. Beyond the area where it is common—from the Appalachians to the Missouri, and the Blue Ridge to the Great Lakes—it follows the river valleys, as is brought out in the map of its distribution. Its rarity in the Atlantic coast states, where it occurs only along a few streams that rise far up in the mountains, is particularly striking. In most directions it has evidently reached the limits to which the climate will permit it to migrate, although there is no obvious reason why it may not ultimately cross the Hudson and enter southern New England.

A member of the Spring flora, *Phlox divaricata* begins to bloom in the south in March, and in the north in April, continuing through May into early June. The stigmas lie below the anthers, but do not become receptive until much of the pollen has been shed, and the delicate fragrance of the flowers attracts many kinds of insects, which bring about cross-pollination; 25 species of moths, butterflies, bees, etc., are listed by Robertson[2] as visiting it.

Variation.—Although on the whole more constant in its characters than the members of the section *Subulatae,* this *Phlox* is variable in several respects. The lower leaves range from narrowly to broadly elliptic, the upper from lanceolate to ovate, within single colonies. Their tips are normally obtusish, but may become acutish toward the inflorescence.

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[1] Records from the National Herbarium sent by Dr. M. O. Malte.

[2] Flowers and Insects 151. 1928.

The most striking variability appears in the corolla characters. The common name, Blue Phlox, refers to the fact that the color of the corolla-limb is bluer than in most other species, although comparison with the plates in Ridgway[1] shows it to be more correctly described as violet. The usual range is from pale violet (59 d) to light amparo purple (63 d). West of the Great Lakes and the Mississippi River bluer hues are dominant, pale bluish violet (57 d) being occasionally approached. Eastward there is a tendency to vary toward light phlox purple (65 d), most marked in eastern Kentucky and southern Ohio; indeed Short,[2] in his "Florula Lexingtonensis," questioned the identity of the plant there with *P. divaricata* because its flowers are "frequently rose-coloured." In most colonies all gradations from these colors to white appear, and occasionally a large patch is whitish throughout; a particularly striking occurrence of this kind on the Mackinaw River flats south of Pekin, Tazewell County, Illinois, was called to my attention by Mr. V. H. Chase, of Peoria. Eye striae may be present, a single broad stripe often lying at the base of each lobe, its hue being the same as that of the rest of the limb, but its tone somewhat deeper. Exceptionally these striae are broadened and reddened, coalescing into a purple ring.

The corolla-tube ranges in length from 10 to 20 mm., and though usually longer than the lobes, is sometimes exceeded by them. The lobes are from 9 to 19 mm. long and 5 to 13 mm. wide. West of the varietal boundary shown on the map (fig. 1) the lobe-ends are normally obtuse and entire, mucronate or apiculate, but only exceptionally definitely notched. East of it, on the other hand, a well-marked sinus 1 to 3 mm. deep is commonly present, although in nearly every colony a few individuals have entire or even apiculate lobes (*cf.* plate 1, fig. 2). Rarely the lobes are much shorter than the tube, and long-acuminate.

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[1] Color Standards and Nomenclature. 1912.

[2] Transylv. Journ. Med. 1: 415. 1823.

If the boundary line mentioned separated plants of consistently different features, the presence of two distinct species, which as noted under History has already been suggested, might be considered. Since, however, mutants within the colonies on one side of the line repeatedly imitate the plants normally found on the other, only varietal distinctness can be admitted. Correspondingly, no key can be drawn up for the identification of isolated specimens, because exceptional individuals would be continually falling into the wrong place. The plan used with the section *Subulatae* is accordingly followed here, the varieties being tabulated in the relative positions they occupy in nature, and the more noteworthy forms being referred to by English descriptive terms.

VARIETIES AND FORMS OF PHLOX DIVARICATA

COROLLA-LOBES NORMALLY ENTIRE; COLOR FREQUENTLY VIOLET.	COROLLA-LOBES NORMALLY NOTCHED; COLOR FREQUENTLY PURPLISH.
Phlox divaricata laphami Wood. *P. d. laphamii* Gray. *P. laphamii* Clute. Occurring west of the varietal boundary described in the text.	**Phlox divaricata canadensis** (Sweet) Wherry, status novus [already in horticultural literature]. *P. canadensis* Sweet. Occurring east of the boundary.
Forms:	Forms:
White (albino). "P. laphami alba" Hort. An occasional mutation in many colonies; sometimes dominant.	**White (albino).** "P. divaricata alba" or "P. canadensis alba" Hort. *P. divaricata* f. *albiflora* Farwell. An infrequent mutation.
Notched. Lobes with a broad sinus up to 1 mm. deep, imitating the eastern variety. Typified by specimen in Gray Herbarium from Franksville, Racine Co., Wisc., collected by S. C. Wadmond May 18, 1899. Rare, very few specimens seen.	**Entire.** Lobes with entire, obtuse terminations, imitating the western variety. Typified by specimen from south bank of James River east of Granite station, Chesterfield Co., Va., collected by E. T. W. April 15, 1927. Fairly common.
Mucronate or apiculate-lobed. Typified by specimen from near Starkville, Oktibbeha Co., Miss., collected by Fannye A. Cook April 3, 1927, in herbarium of E. T. W. Frequent, grading into erose-margined.	**Mucronate or apiculate-lobed.** Typified by specimen from ¼ mile southwest of Cabin John, Montgomery Co., Md., collected by E. T. W. May 1, 1930. Much rarer than in the western variety, and usually only erose.
Long-acuminate-lobed. Typified by specimen from 5 miles north of Huntsville, Madison Co., Ark., collected by J. E. Benedict, Jr. April 16, 1928, in herbarium of E. T. W. Very rare.	**Long-acuminate-lobed.** Dominant in a colony near Crawfordsville, Montgomery Co., Ind., and widely known as the "Crawfordsville form." An exceptional mutation in Lawrence Co., Pa.

Cultivation.—The earliest reference to the introduction of *Phlox divaricata* into horticulture is a notation in Collinson's catalog of his garden, recorded by Dillwyn:[1] "A very pale blue early Lychnidea in flower May 5, 1740, not in England before; now in most gardens; from the Susquehanna River." A letter from Collinson to Bartram, dated June 10, 1740, and later published by Darlington,[2] includes the remark that "amongst the last things, there is a very pretty *Lychnis,* with pale blue flowers, and sweet smell," the same plant evidently being referred to, for Bartram's correspondence shows that he confused the two genera, *Lychnis* and *Lychnidea.* In various writings, Linné[3] replaced the latter name by *Phlox,* and in the 6th edition of the Gardeners' Dictionary, Miller[4] listed the present species as "3. Phlox foliis lanceolatis obtusis, floribus majoribus umbellatim dispositis. Begins flowering in May; flowers large and of sky-blue colour."

The horticultural value of this *Phlox* has been referred to by numerous subsequent writers, and many dealers now list it, using various combinations of the names divaricata, canadensis, laphami or laphamii, alba, etc. The variety with violet ("blue") entire-lobed corollas, the correct name for which is *P. divaricata laphami,* is on the whole the more showy plant, some splendid vigorous strains of it having been developed. That with notched lobes and more purplish (lilac) hue, *P. d. canadensis,* is usually relatively delicate, but also has considerable merit from this standpoint.

Phlox divaricata has been used as one parent of a series of hybrids which are offered by some nurseries under the name "Phlox arendsii." In this case the tall, late-blooming *P. paniculata* was the second parent, and the hybrids are intermediate in habit, flower color, and blooming time between the two. Garden hybrids of *P. divaricata* with other species are probably in the trade to some extent, but appear to have received no distinctive names.

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[1] Hortus Collinsonianus 39. 1843.

[2] Memorials of Bartram and Marshall 136. 1849.

[3] Genera Plantarum 52. 1737; Hortus Cliffortianus 63. 1737.

[4] Gardeners' Dict., ed. 6. 1752.

5. **Phlox pilosa** Linné. DOWNY PHLOX. Plate 2.

History.—Of the three figures of *Phlox* published by Plukenet[1] in 1691, two represented members of the *Subulatae,* and have been discussed in the paper on that section. The other, described as "Lychnidaea umbellifera Blattariae accedens Virginiana major, repens, Pseudo-melanthii foliis pilosis, flore albo, pentapetaloide, fistuloso," belongs to the *Divaricatae.* What is clearly the same species was listed a few years later by Ray[2] as "Lychnoides *Marilandica,* Jasmini flore quinquepartito, calycibus lanuginosis, foliis angustis acutis." When Linné[3] came to characterize the species of *Phlox,* no specimen of this was at hand, so he cited the above references, and based the diagnosis of *P. pilosa* upon them. The specimen from which Plukenet's figure was evidently drawn is preserved, however, in the Sloane herbarium at the British Museum, and in 1928 it was kindly compared by Mr. A. J. Wilmott with some eastern American material taken to England by Dr. William R. Maxon. There proved to be agreement with a recently collected Virginia specimen in leaf characters, glandular calyx, and puberulent corolla-tube, thus establishing the proper application of the Linnean name.

During his famous explorations in North America, Michaux[4] encountered three of the Phloxes of the section *Divaricatae.* He succeeded in recognizing one correctly as Linné's *P. divaricata,* but mistakenly applied the name *P. pilosa* to the species here taken up last, proposing for the present one a new name, *P. aristata,* with two varieties, α *virens* (purple-flowered) and β *canescens* (rose- and white-flowered). His usage was followed by various subsequent botanists, but was recognized to be erroneous by Gray[5] in 1856, and in recent years the name *aristata* has fallen into disuse. Michaux's specimens are preserved in Paris, and photographs of them obtained for me in 1928 by Mr. Ivar Tidestrom, of the Bureau of Plant Industry, confirm the correctness of Gray's view.

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[1] Phytographia pl. 98, fig. 1. 1691.

[2] Supplem. Hist. Plant. 490. 1704.

[3] Species Plantarum (1): 152. 1753.

[4] Flora Boreali-Americana (1): 144. 1803.

[5] Manual of Botany, ed. 2. 331. 1856.

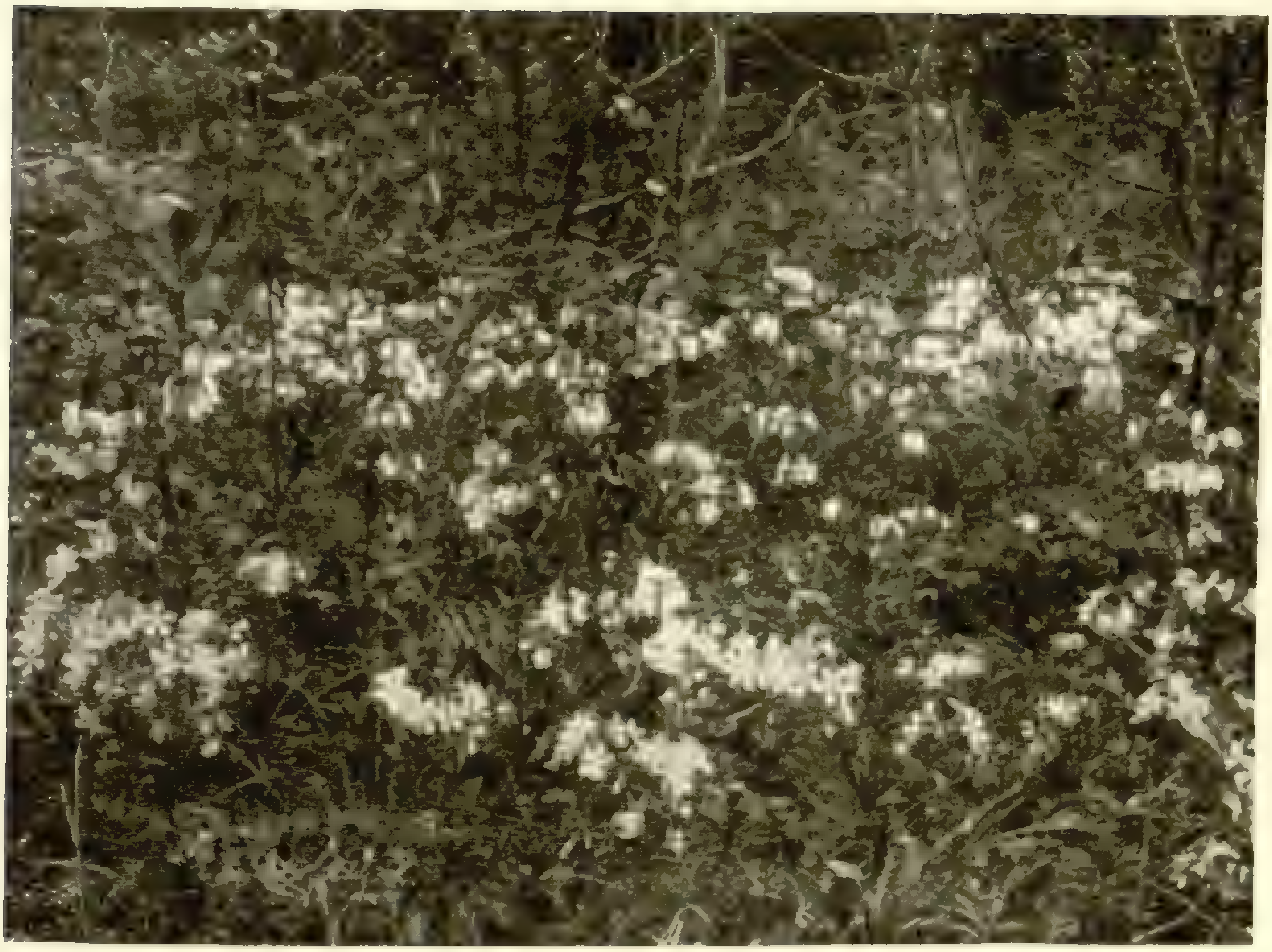

FIG. 1. *Phlox pilosa virens.*
Five miles northwest of Cottonville, Marshall County, Alabama.

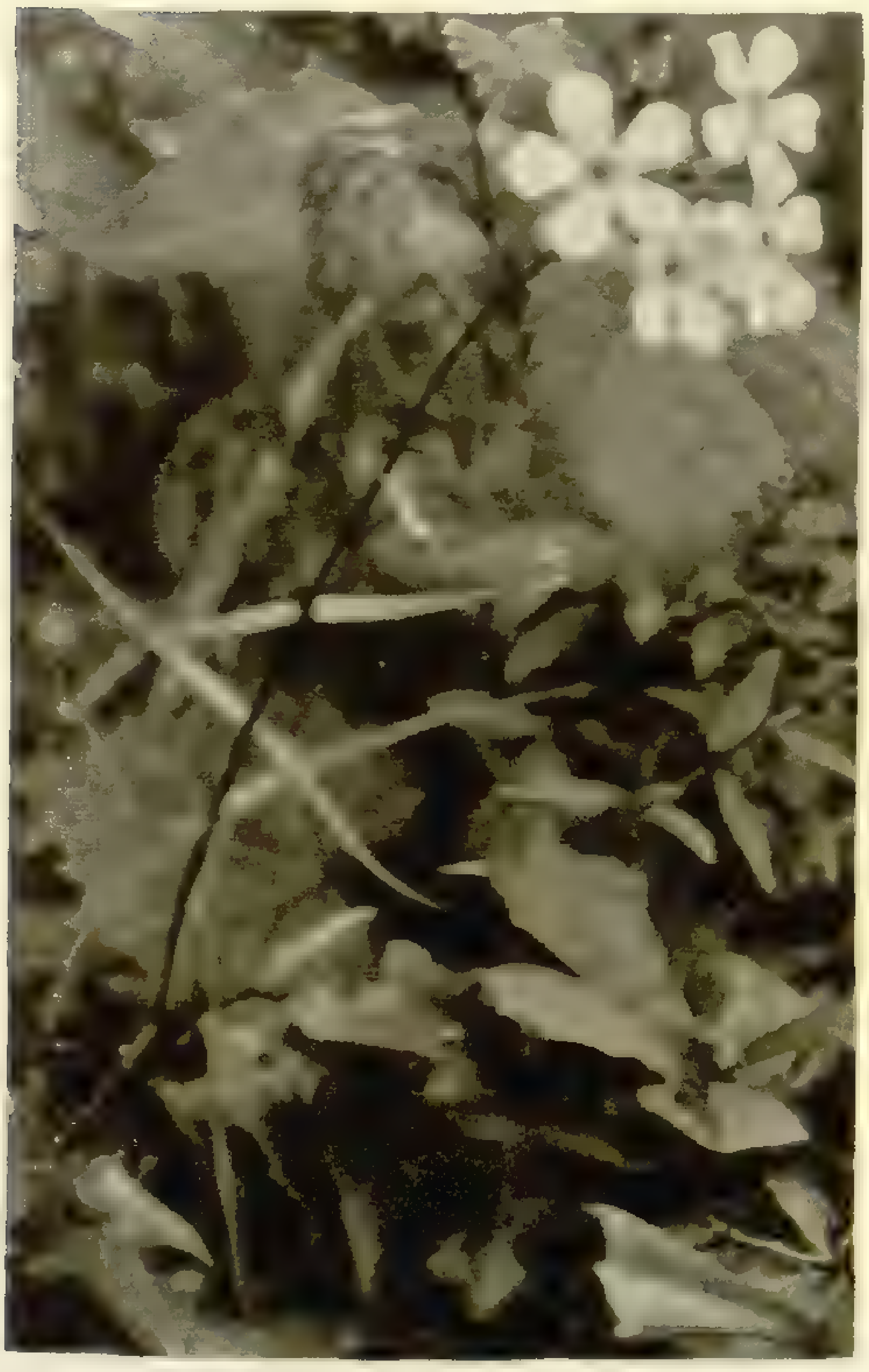

FIG. 2. *P. pilosa detonsa.*
Hillsborough County, Florida.

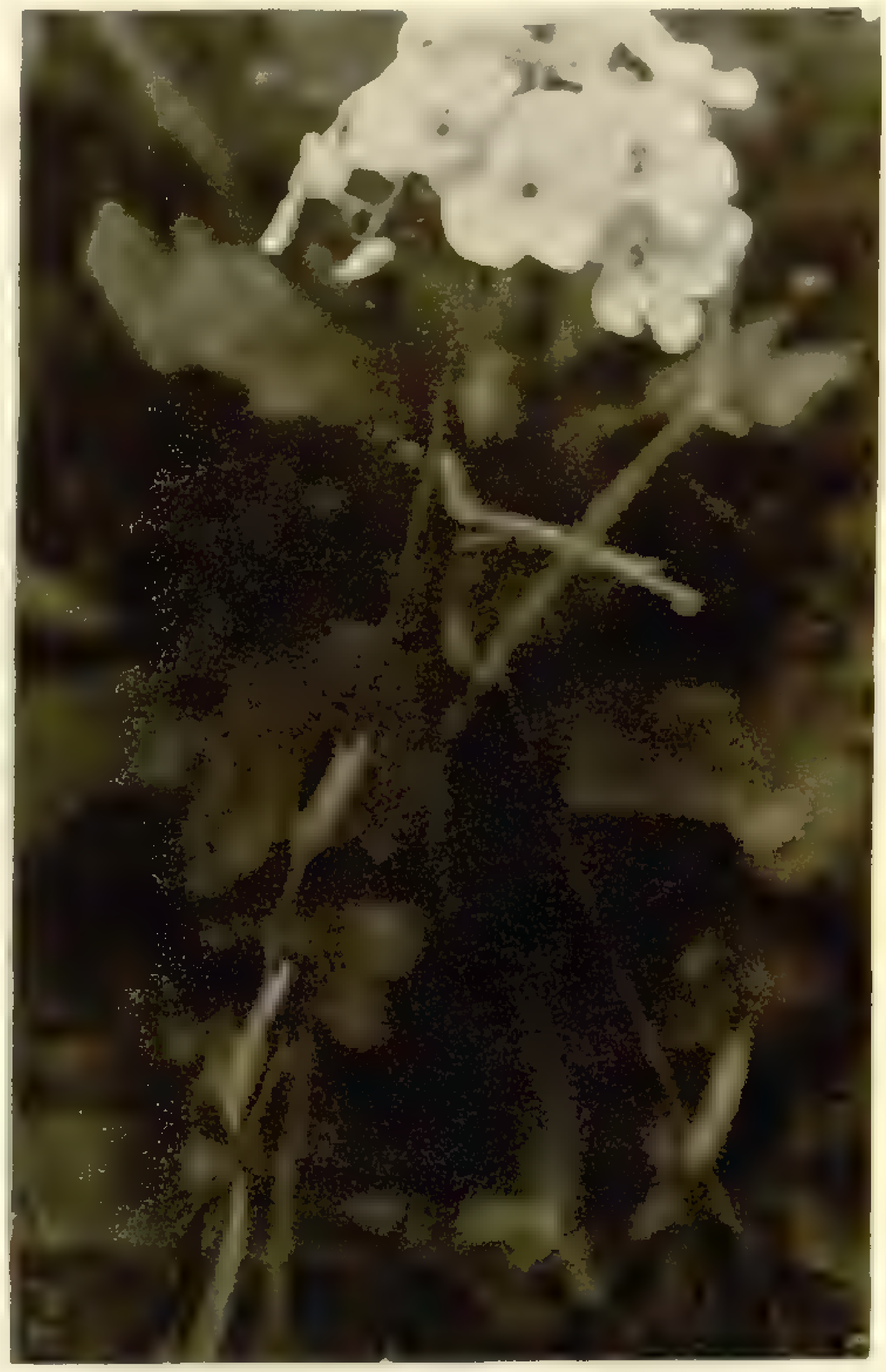

FIG. 3. *P. floridana.*
Leon Co., Florida (H. Kurz, photo).

In 1817 Rafinesque[1] proposed for "a real Phlox akin to *P. pilosa,*" observed by Robin in Louisiana, the name *P. amplexicaulis.* Most authors have ignored this or indicated its identity to be unknown, but Brand[2] assigned it, with a question, to *P. divaricata.* The characterization, "foliis amplexicaulis lineari subulatis rigidis; panicula confertiflora, calyx striatus pilosus, dentibus ovatis acuminatis," sounds like a composite of several species, but comes as close to describing the southern Mississippi basin variety of *P. pilosa* as could be expected. His name is accordingly here taken up for this variety, although the feature to which it refers is not really distinctive.

The next name to be considered is *Phlox glutinosa,* applied by Buckley[3] in 1843 to an occurrence at Black's Bend, Wilcox County, Alabama, differing from *P. "aristata"* (*pilosa*) in having fewer and taller stems, broader leaves which are mucronate instead of long-acuminate and are covered with gland-tipped hairs, and bright red or scarlet flowers. Buckley's own specimen of this is at the Missouri Botanical Garden, but the type is in the Gray Herbarium. Gray, who seemed to take delight in criticizing Buckley, wrote on the latter sheet "Surely flowers *not* 'red or scarlet.' Dr. Torrey's four specimens from Buckley plainly show this to be a form of *P. divaricata.*" He added similar remarks to Torrey's sheet, which is preserved at the New York Botanical Garden, and reaffirmed his view in his writings; but he overlooked the long awns on the calyx-lobes and the pubescence on the corolla-tube, which, together with the foliar characters, point unmistakably to its being a hybrid of *P. divaricata* with *P. pilosa.* In the hope of obtaining fresh material for study, I have visited the type region on three different occasions, but since Buckley's day the woods have been extensively cut over, and although *P. pilosa* is locally abundant, and *P. divaricata* sometimes grows near it, the search for the hybrid has been unsuccessful.

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[1] Florula Ludoviciana 36. 1817.

[2] In Engler's Pflanzenreich IV. 250: 72. 1907.

[3] Amer. Journ. Sci. 45: 177. 1843.

Phlox cuspidata, applied to a Texan plant by Scheele[1] in 1850, is sometimes regarded as synonymous with *P. pilosa,* but the description fits better *P. drummondii* Hooker.

In revising the Polemoniaceae in 1870, Gray[2] assigned the glabrous-leaved phases of *P. pilosa,* such as are especially common in the Gulf States, to a variety *detonsa.* This was raised to species rank by Small;[3] but it grades too freely into the wide-spread variety of *P. pilosa* to be so maintained.

One more name remains to be considered, and in order to account for the interpretation of it adopted, the northwestern representative of the species must be referred to at this point. Over much of its range, *P. pilosa* has its inflorescence strongly glandular, with only occasional glandless variants. On the prairies of the upper Mississippi basin, however, the hairs on the inflorescence are normally glandless, dense, and lustrous, constituting a well-marked geographic variety. In describing their *P. argillacea,* Clute and Ferriss[4] contrasted it with this prairie Phlox, noting it to have the calyx and bracts glandular-hispid, and emphasizing its "lighter green leaves, greater height, less compact flower clusters, restricted habitat, and above all . . . pale flowers and later and longer season of bloom." Most of these, however, are the very respects in which Linné's *P. pilosa* differs from the prairie variety. Plants with pallid or near-white corollas are common in colonies of *P. pilosa,*[5] and indeed the Plukenet specimen, which is taken as the type of the species, was one of these. When the Illinois "*P. argillacea*" is grown beside such Virginian material, the only way in which they can be distinguished is by the greater vigor of the former, a difference of horticultural but not taxonomic significance. It can only be concluded that technically *P. argillacea* Clute and Ferriss is synonymous with *P. pilosa* Linné.

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[1] Linnaea 23: 139. 1850.

[2] Proc. Amer. Acad. Arts Sci. 8: 251. 1870.

[3] Flora Southeastern U. S. 978. 1903.

[4] Amer. Botanist 17: 74. 1911.

[5] The combination *P. pilosa* forma *albiflora* has been published by Macmillan (Metasp. Minn. Valley 432. 1892) but applies to the albino form of the prairie variety.

Geography.—The range of *Phlox pilosa* extends farther west and northwest, but not so far northeast, as that of *P. divaricata,* comprising all provinces except those at the highest elevations, from Florida to central Texas, southern Manitoba, and southwestern Connecticut. Figure 2 presents the details as to the four varieties here considered.

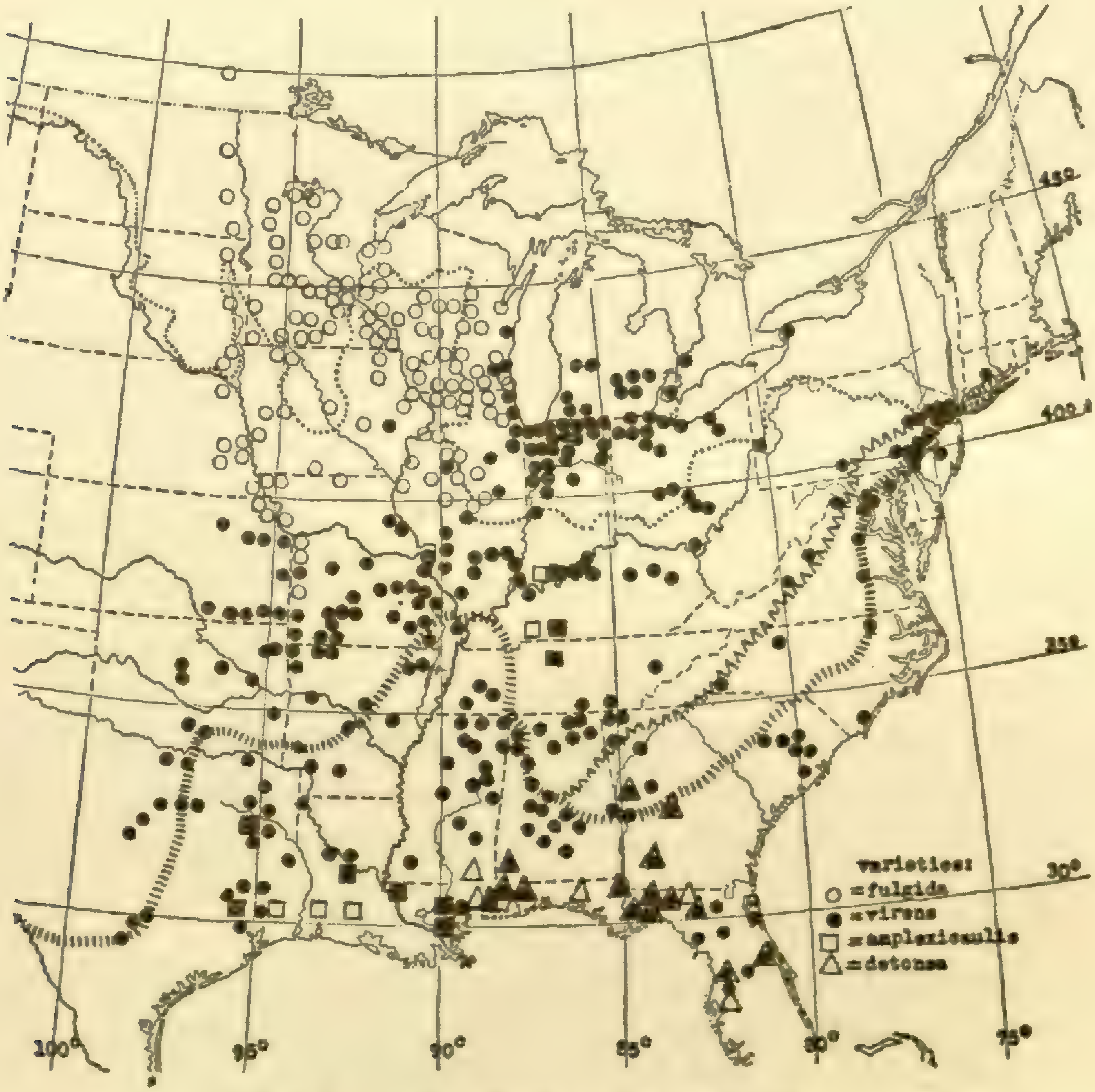

FIG. 2. Distribution of *Phlox pilosa.*

The curiously patchy distribution shown in many parts of this map can not as yet be fully accounted for, but the indications are that the species has migrated out from a dispersal-center in the Ozark region. None of the physiographic boundaries traced on the map appear to have restricted it, but its absence from the Appalachians is evident.

Alabama: Common except in the higher mountains, there being records from 24 counties: Autauga′, Baldwin, Bibb′, Butler′, Clarke, Cullman, Dallas, De Kalb′, Fayette′, Franklin′, Hale′, Jackson′, Lawrence, Lee, Madison′, Marengo′, Marion′, Marshall′, Mobile′, Montgomery, Perry′, Tuscaloosa′, Washington, and Wilcox′. Both wide-spread (*virens*) and Gulf Coast (*detonsa*) varieties are represented.

Arkansas: Probably occurs in most parts of the state, although specimens have been seen from but the following 13 counties: Benton, Boone′, Carroll′, Faulkner, Garland, Greene, Hempstead, Howard, Lawrence, Logan, Ouachita, Prairie, and Washington′. A broad-leaved variety or possibly distinct species also occurs locally; it is to be discussed in a future paper dealing with the Phloxes of the Ozark and Texan regions.

Connecticut: The northeasternmost known stations for the species are in New Haven County.

Delaware: Thus far observed only in New Castle, the northernmost county in the state.

District of Columbia:′ Has been collected from two stations toward the northwest side.

Florida: Both wide-spread and Gulf Coast varieties are known, the county list being: Alachua, Columbia, Dixie, Hernando′, Hillsborough′, Jackson, Jefferson′, Lake, Leon′, Liberty′, Madison′, Pasco, St. Johns, Suwannee′, Volusia, Wakulla, and Walton.

Georgia: Apparently rather rare, having been collected only in Cobb′, Dougherty, Floyd, Meriwether, Muscogee, Peach, Spalding, Walker′, and Whitfield′ counties.

Illinois: Common and abundant, there being records from 36 counties: Champaign, Christian, Clay, Cook′, Du Page, Fulton, Hancock, Henderson, Henry, Jackson, Jefferson, Jo Daviess, Kane, Kankakee, Lake′, Livingston, Macon, Macoupin, Madison, Marion, Marshall, McHenry, McLean, Menard, Ogle, Peoria, Piatt, Richland, Rock Island, St. Clair, Stark, Stephenson, Tazewell, Wabash, Will, and Winnebago. The wide-spread and prairie (*fulgida*) varieties are about equally developed.

Indiana: Less frequent than *P. divaricata,* even Mr. Deam's thorough collecting having turned it up in but 31 counties: Allen, Benton, Cass, Clark, Elkhart, Floyd, Fulton, Harrison, Jasper, Kosciusko, Lagrange, Lake, Laporte, Marshall, Montgomery, Newton, Noble, Perry′, Porter′, Posey, Pulaski, St. Joseph, Spencer′, Starke, Steuben, Tippecanoe, Tipton, Vigo, Warren, Wells, and White. The southern Mississippi basin variety extends into Perry and Spencer counties.

Iowa: The prairie variety is known in 12 widely scattered counties: Carroll, Crawford, Decatur, Dickinson, Dubuque, Emmet, Fayette, Jones, Pottawattamie, Poweshiek, Story, and Winneshiek. The wide-spread variety is reported from Johnson County.

Kansas: Recorded from Atchison, Brown, Chautauqua, Cherokee, Cowley, Douglas, Johnson, Labette, Linn, Montgomery, Riley, and Shawnee counties. Both wide-spread and prairie varieties are represented.

Kentucky: Apparently rare, being known from but 6 counties: Bath, Christian′, Fayette, Henderson, Jefferson, and Morgan. In addition, Short distributed specimens labelled "barrens of Kentucky," which may have come from Barren or Logan County. The southern Mississippi basin variety is present locally.

Louisiana: Collected from 9 parishes: Acadia′, Caddo′, Calcasieu, Feliciana, Grant, Natchitoches, Orleans, Rapides, and St. Tammany. Two varieties are included.

Maryland: The observation of this species in Maryland in early colonial days was mentioned under History. In subsequent times it has been largely destroyed by agricultural development, but specimens are preserved from Baltimore and Montgomery′ counties.

Michigan: Scattered in the southern part, the county list being: Cass, Ingham, Ionia, Jackson, Kent, Livingston, Oakland, St. Joseph, Van Buren, and Washtenaw.

Minnesota: Occurs throughout except northward, specimens having been seen from 34 counties: Becker, Brown, Carver, Cass, Chippewa, Dakota, Douglas, Faribault, Fillmore, Goodhue, Hennepin, Houston, Hubbard, Jackson, Kanabec, Kandiyohi, Lincoln, McLeod, Martin, Meeker, Mille Lacs, Morrison, Nicollet, Olmsted, Otter Tail, Pope, Ramsey, Rice, Rock, Scott, Stearns, Wabasha, Waseca, and Winona. Only the prairie variety is present.

MISSISSIPPI: The commonest *Phlox* in the state, there being 19 county records: Choctaw, Clay, Forrest, Franklin, Grenada, Hancock, Harrison, Holmes, Itawamba′, Jackson, Jasper, Lafayette′, Marshall′, Noxubee, Oktibbeha′, Pontotoc′, Scott, Tippah, and Tishomingo. Both wide-spread and Gulf Coast varieties are included.

MISSOURI: Specimens of the varieties covered in this article have been seen from 34 counties: Atchison, Bates, Benton, Butler′, Carter, Cass, Christian, Cole, Crawford, Greene, Iron, Jackson, Jasper, Jefferson, Laclede, McDonald, Madison, Nodaway, Phelps, Pike, Platte, Putnam, Ralls, St. Francois, St. Louis′, Scott, Shannon, Stone, Taney, Vernon, Washington, Wayne, Webster, and Wright.

NEBRASKA: The prairie variety occurs in the eastern part of the state, in Cass, Dixon, Douglas, Lancaster, Richardson, and Saunders counties.

NEW JERSEY: Occasional north of the Pine-barrens, there being 6 county records: Burlington, Essex, Morris, Somerset, Union, and Warren′.

NEW YORK: The only specimen seen from the state is one in the Gray Herbarium from Niagara Falls, Niagara County.

NORTH CAROLINA: Apparently rare, and reported from but 4 counties: Forsyth, Halifax, New Hanover′, and Polk.

NORTH DAKOTA: The prairie variety is recorded from Cass, Grand Forks, and Richland counties, along the eastern border.

OHIO: Known in 17 counties, chiefly northern and south-central: Athens, Cuyahoga, Defiance, Erie, Fairfield, Franklin, Fulton, Hancock, Henry, Hocking, Lawrence, Lucas, Madison, Ottawa, Summit, Wood, and Wyandot.

OKLAHOMA: Scattered throughout the eastern part, specimens being preserved from 9 counties: Creek, Delaware′, Johnston, Le Flore, Logan, Mayes′, Murray, Muskogee, and Oklahoma′. All represent the wide-spread variety.

PENNSYLVANIA: Restricted to the western edge and the southeast corner, in 9 counties: Beaver, Bucks, Chester, Delaware, Franklin, Lancaster′, Lehigh, Montgomery′, and Northampton′.

SOUTH CAROLINA: Rare, specimens having been seen only from Berkeley, Clarendon, Florence, Richland, Sumter, and Williamsburg counties.

SOUTH DAKOTA: The prairie variety occurs in a few eastern counties: Brookings, Clay, Lincoln, and Roberts.

TENNESSEE: Scattered throughout, specimens being preserved from Chester, Davidson, Fayette, Franklin, Hamilton, Knox, and Madison counties. The southern Mississippi basin variety is represented in the second.

TEXAS: Wide-spread east of longitude 98° 30′, there being records for 24 counties: Bexar, Cherokee, Comal, Comanche, Cooke, Dallas, Erath, Gregg, Grimes, Hardin, Harris′, Lamar, Liberty, Montague, Montgomery, Parker, Polk, Rusk, San Augustine, Smith, Tarrant, Titus, Walker, and Wood. Besides the varieties here discussed, another occurs westward. Its distribution and relationships will be treated in a subsequent paper on phloxes of the south-central states.

VIRGINIA: Although the type locality of the species was in this state, it is not common there, being definitely known from but 6 counties: Augusta, Botetourt, Chesterfield′, Fairfax′, Frederick, and Spotsylvania.

WISCONSIN: Common throughout, the county records being: Barron, Bayfield, Brown, Buffalo, Burnett, Clark, Columbia, Crawford, Dane, Dunn, Grant, Green, Jackson, Jefferson, Juneau, Kenosha, Lafayette, Milwaukee, Monroe, Pierce, Portage, Racine, Richland, Rock, St. Croix, Sauk, Shawano, Sheboygan, Trempealeau, Walworth, Washburn, Washington, Waukesha, Waupaca, Waushara, Winnebago, and Wood. The wide-spread variety barely enters the southeastern corner.

CANADA. MANITOBA: The prairie variety extends to Winnipeg, in Iberville County.

ONTARIO: Limited, so far as known, to Essex and Lambton counties, at the southern end.

Ecology.—*Phlox pilosa* grows in many sorts of habitats,—fields, rocky slopes, open woods, and even exceptionally swamps. It seems to prefer subacid soils. Occasional as a pioneer, it increases in abundance rapidly as later successional stages develop, but thins out again as climax forest conditions are approached. It is more xerophytic than *P. divaricata,* and extends westward a short distance into the semi-arid parts of Texas. Since the ice of the last glacial stage retreated it has migrated northward at least 350 miles (550 km.), corresponding to an average rate of a mile per hundred years.

The distribution map, fig. 2, suggests the species as a whole to have had a dispersal center in the south-central part of the United States, perhaps in the Ozark region, from which the several varieties spread out in different directions. On the north and west, climatic barriers have no doubt been reached, but such can hardly be the case toward the northeast, and if man does not prevent, the plant may gradually extend its range there.

In the south *Phlox pilosa* begins to bloom about the first of April, further north in early or even late May. The duration of flowering varies widely from one colony to another, being at times two or three weeks, or again as many months. As in most Phloxes, the stigmas ripen after the anthers. The flowers of some of its races are even more fragrant than those of *P. divaricata,* the scent resembling that of *Azalea viscosa* or *Dianthus* spp. Robertson observed twenty insect visitors, chiefly butterflies and long-tongued bees.

Variation.—The variability of *Phlox pilosa* is so marked that the tendency on the part of some students to split it into several species is easily accounted for. Field study throughout its range shows, however, that all gradations between the extremes exist, so that only a separation into varieties is justifiable.

Most frequently the plants are pubescent throughout, but locally there may be a tendency toward loss of hairs. This appears first on the lower leaves, then on the upper ones, and finally on the stem, the inflorescence usually (though not invariably) retaining its pubescence intact. More or less glabrous-leaved plants may occur in any part of the range, as isolated individuals in the midst of numerous normal ones, but in certain regions they increase in frequency. Thus, in both Illinois and Indiana colonies are known in which pubescent and glabrate plants are roughly equal in number. The climax of this phenomenon appears, however, along the Gulf Coast from Mississippi to Florida, where many colonies are made up entirely of glabrous-leaved individuals, leading to the recognition there of a distinct variety. Exceptionally the relative hairiness of the upper and lower parts of the plant may be reversed,—the leaves be pubescent but the inflorescence glabrous.

Over the greater part of the range the hairs on the inflorescence are conspicuously gland-tipped, while those on the lower part of the plant are glandless. Occasionally, however, glands extend down the stem, and sometimes even over the leaves. This feature reaches its maximum development in the Ozark region, where in some colonies the plants are viscid-glandular practically throughout. The opposite tendency, toward disappearance of glandularity, is more wide-spread. In the midst of many colonies of plants with glandular inflorescence occasional mutants occur in which the hairs lack glands entirely. Colonies made up wholly of glandless plants are not known in the eastern states, but in the Mississippi basin they are frequent, and northward become dominant. The inflorescence-hairs on such plants vary considerably, tending to be coarser in the south.

The normal leaf-outline of *Phlox pilosa* is lanceolate-acuminate, but deviations are not infrequent. Broadening of at least the upper leaves to an ovate shape may occur in any colony. Narrowing to linear outline is most marked along the Gulf Coast. The calyx-lobes vary from subulate to broadly linear, without evident correlation with leaf-outline.

Phlox-purple is the typical corolla-color in this species, but it is by no means constant. Pallid color-forms are occasional in all colonies, and dominant in some, while complete albinos are not infrequent. A light violet or lavender hue similar to that of *P. divaricata* appears locally, and in certain colonies seen in the uplands of Alabama purple, violet, and white forms were about equally abundant. A pale eye with more or less prominent superimposed striae is often developed. Sometimes there is a single central broad stripe on each lobe, of similar hue to the outer portions; more often there is a pair of lateral ones, either redder or bluer, and occasionally both occur together. These striae may broaden and coalesce into a deep-colored ring, which is especially striking in otherwise pallid corollas.

In corolla-dimensions this species is rather less variable than *P. divaricata,* and no geographic segregation in this feature can now be recognized. Usually a whole colony is characterized by having the corollas all relatively small, or all large. The lobes range from cuneate to orbicular-obovate, and from terminally obtuse to mucronate or apiculate. The corolla-tube is often pubescent, but may be glabrous on individual plants or throughout whole colonies.

On the opposite page the well-marked varieties[1] and forms which it seems possible to recognize in the midst of this vast series of variations, are tabulated according to the "geographic" plan already used. The wide-spread variety is regarded as ancestral to the others not only because these occupy more restricted areas, but also because mutations which appear within colonies of the wide-spread one imitate or approach all of the other varieties.

Cultivation.—Phlox pilosa is little known in cultivation, probably largely because in rich garden soils it has proved to be short-lived. The vigorous race from the southern end of Lake Michigan, "P. argillacea," seems, however, well adapted to garden conditions, and has received favorable comment in horticultural circles. Other varieties and forms deserve more attention from this standpoint.

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[1] Only varieties known to grow east of the Mississippi River are here included. Additional ones occur further west, one with foliaceous calyx-lobes (*P. aspera* E. Nelson) in Texas, and others with often very broad leaves in Arkansas, Louisiana, and Missouri. These will be discussed in a later article.

VARIETIES AND FORMS OF PHLOX PILOSA

INFLORESCENCE-HAIRS GLANDLESS, FINE; CALYX-LOBES BROADISH.

Phlox pilosa fulgida Wherry, var. nov. Named from the lustrous inflorescence-hairs. Typified by specimen in U. S. National Herbarium from Fort Snelling, Hennepin Co., Minn., collected by E. A. Mearns June 12, 1891. Dominant on the prairies of the upper Mississippi basin.

Form:

White (albino). *P. pilosa* forma *albiflora* MacMillan. Rare.

USUAL FEATURES: LEAVES PUBESCENT WITH GLANDLESS HAIRS, INFLORESCENCE-HAIRS GLANDULAR, CALYX-LOBES NARROW AND LONG-AWNED, AND COROLLA-TUBE PUBESCENT.

Phlox pilosa virens (Michaux) Wherry, comb. nov. *P. aristata virens* Michx. The widespread variety: Tex. to Fla., northward to Kans., SE. Wisc., and SW. Conn., avoiding the highest elevations.

Forms:

Glabrous-leaved. Typified by specimen from 1½ miles southwest of Knox, Starke Co., Ind., collected by C. C. Deam May 30, 1929, in herbarium of E. T. W. A variation, most frequent in Ill. and Ind.

Glandless (as to inflorescence-hairs). Typified by specimen from 1½ miles north of Zieglersville, Montgomery Co., Pa., collected by E. T. W. May 26, 1930. An occasional mutation throughout.

Glabrous-tubed. Typified by specimen from 1½ miles east of Huntsville, Madison Co., Ala., collected by E. T. W. April 29, 1929. A rare mutation northward, but often dominant in southern colonies.

Light-colored (pink, pale violet, white, etc.). *P. pilosa* Linné as to type citation from Plukenet; *P. aristata canescens* Michx. *P. argillacea* Clute and Ferriss. Common and locally dominant.

INFLORESCENCE-HAIRS GLANDLESS, COARSE; CALYX-LOBES OFTEN RATHER BROAD.

Phlox pilosa amplexicaulis (Rafinesque) Wherry, status novus. *P. amplexicaulis* Raf. Rare, E. Tex. to La. and Tenn. to S. Ind.

Form:

Glabrous-sepalled. Typified by specimen in U. S. National Herbarium from near Covington, St. Tammany Parish, La., collected by Bro. G. Arsène April 12, 1920. Known in La. only.

LEAVES CONSISTENTLY GLABROUS; INFLORESCENCE MUCH AS IN WIDESPREAD VARIETY.

Phlox pilosa detonsa Gray. *P. detonsa* Small. Common near the Gulf coast, Fla. to Miss. (reports farther W. refer to prec.).

Form:

Glabrous-sepalled. Typified by specimen from 3 miles east of Hopewell station, Hillsborough Co., Fla., collected by E. T. W. April 18, 1930. Known in Fla. only.

The following hybrids have been observed:

P. divaricata canadensis × *P. pilosa amplexicaulis.* Ind.!
P. divaricata canadensis × *P. pilosa virens.* Ala.!
P. divaricata laphami × *P. pilosa virens.* (*P. glutinosa* Buckley.)

6. **Phlox floridana** Bentham. Florida Phlox.[1] Plate 2, fig. 3.

History.—This species was first collected by Chapman, and named by Bentham[2] in 1845. Shuttleworth distributed specimens of it under the name "P. rigida," first published by Brand.[3] In the Kew Index[4] "P. nuttalli" or "nuttalliana" Hort. and "P. carolina" Sweet[5] are referred to *P. floridana,* but judging from Sweet's plate really belong to *P. maculata.*

Geography.—Specimens have been seen only from counties indicated by dots on the accompanying map, figure 3, showing the species to be endemic in a rather small area.

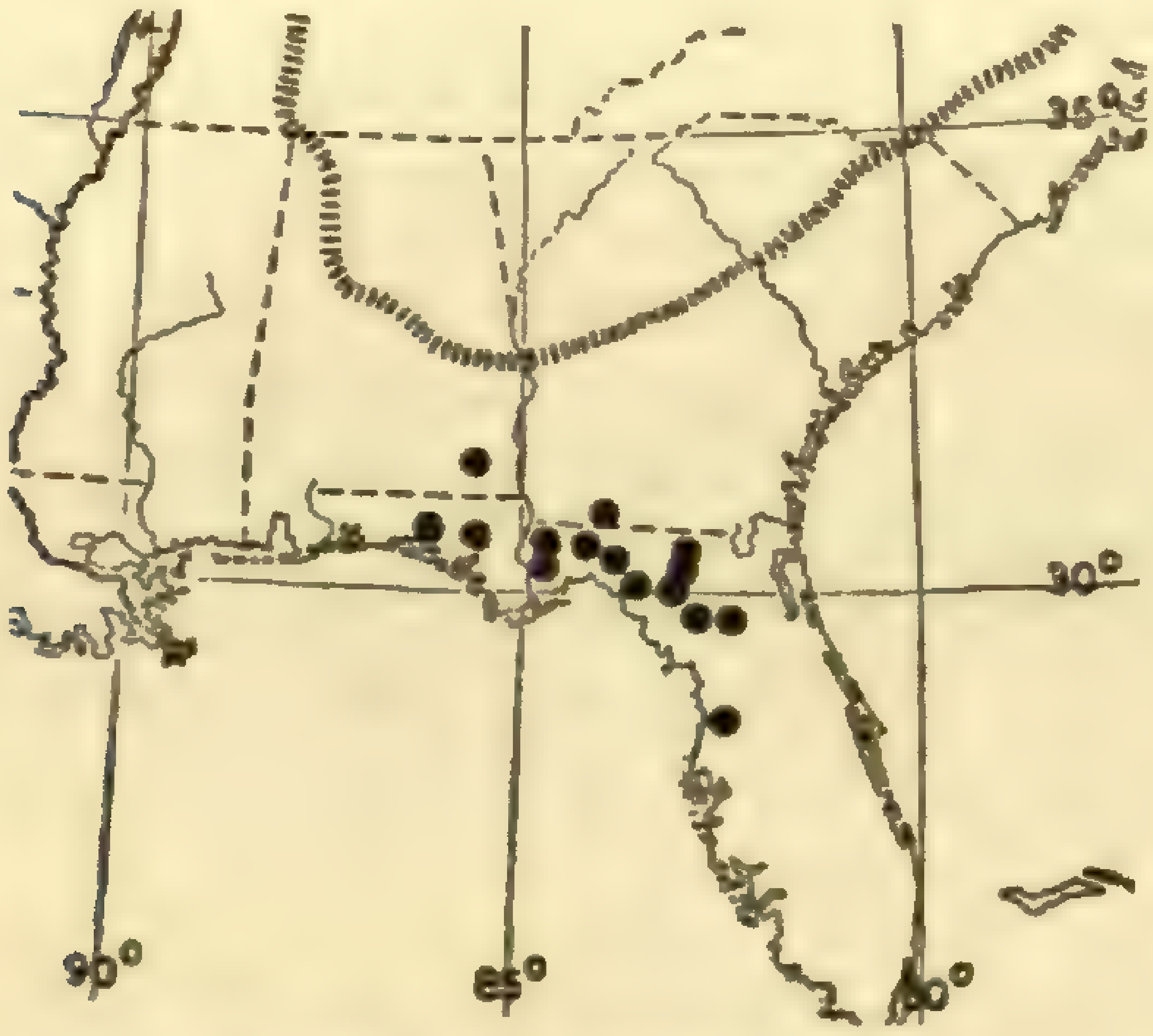

Fig. 3. Distribution of *Phlox floridana.*

Alabama: Reported from several localities by Mohr,[6] but his specimens so labelled all represent forms of *P. pilosa.* In 1925, however, I collected it at Ozark, Dale′ Co.

Florida: The county list is: Alachua, Gadsden, Gilchrist, Hamilton, Hernando′, Jefferson, Lafayette, Leon′, Liberty, Suwannee, Taylor, Walton, and Washington.

Georgia: In Thomas Co.

Ecology.—The Florida Phlox grows chiefly in open oak-pine woods on dry sand-clay soil of subacid reaction. Whether its restricted range is due to lack of hardiness or to some defect in its means of dispersal has not been ascertained. It blooms about a month later than the related *P. pilosa* in the same regions,—during May and June.

Variation.—Apparently more uniform than the other members of the section.

Cultivation.—Reports of *Phlox floridana* being in cultivation have proved to be based on mistaken identification.

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[1] For data on this species I am indebted to Professor Herman Kurz of the State College for Women at Tallahassee, Florida.

[2] In De Candolle's Prodromus 9: 304. 1845.

[3] In Engler's Pflanzenreich IV. 250: 69. 1907.

[4] Index Kewensis (3): 500. 1894.

[5] British Flower Garden 3: pl. 190. 1826.

[6] Plant Life of Ala. 685. 1901.

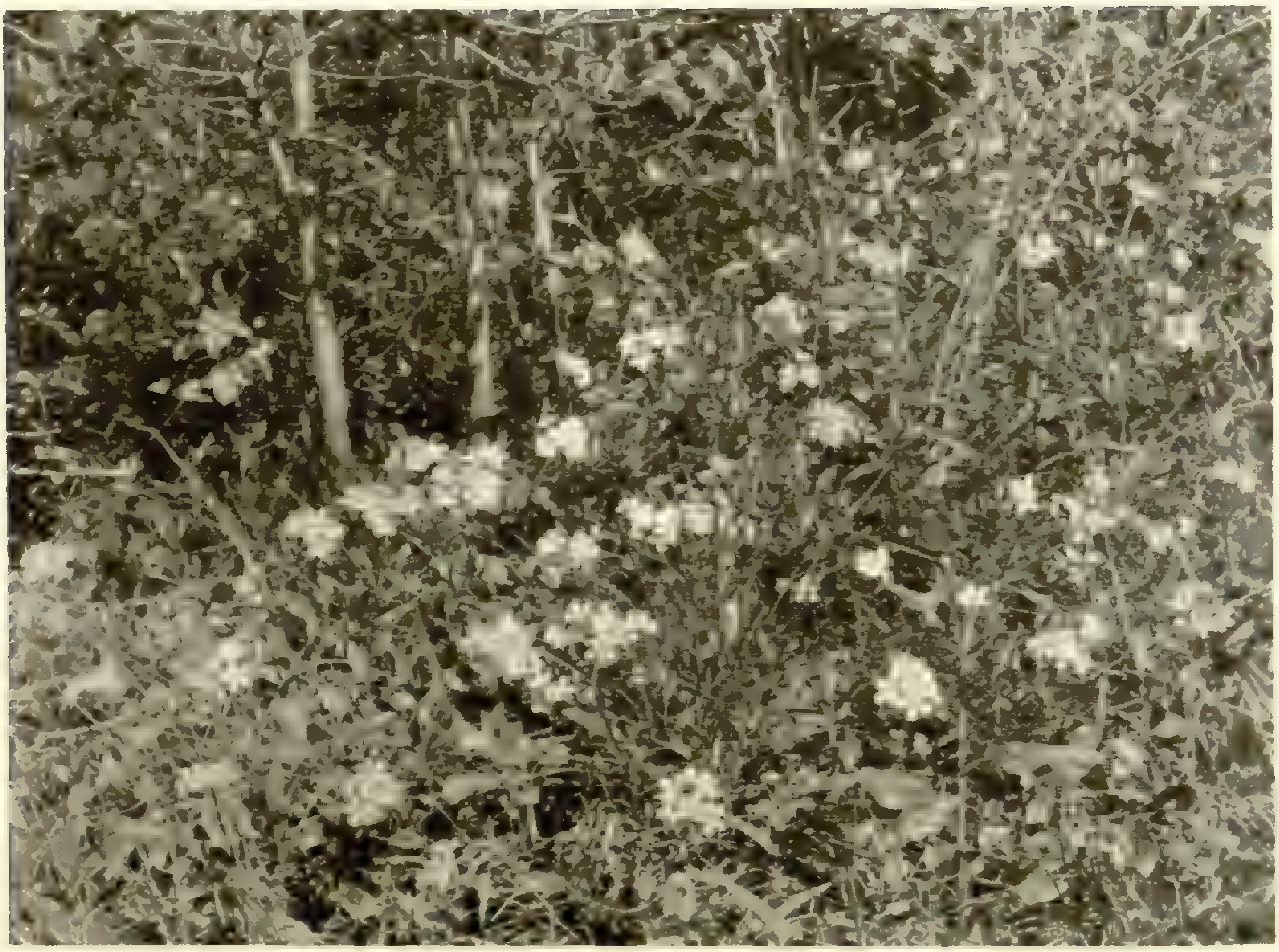

FIG. 1. *Phlox amoena walteri.*
Six miles north of Jemison, Chilton County, Alabama.

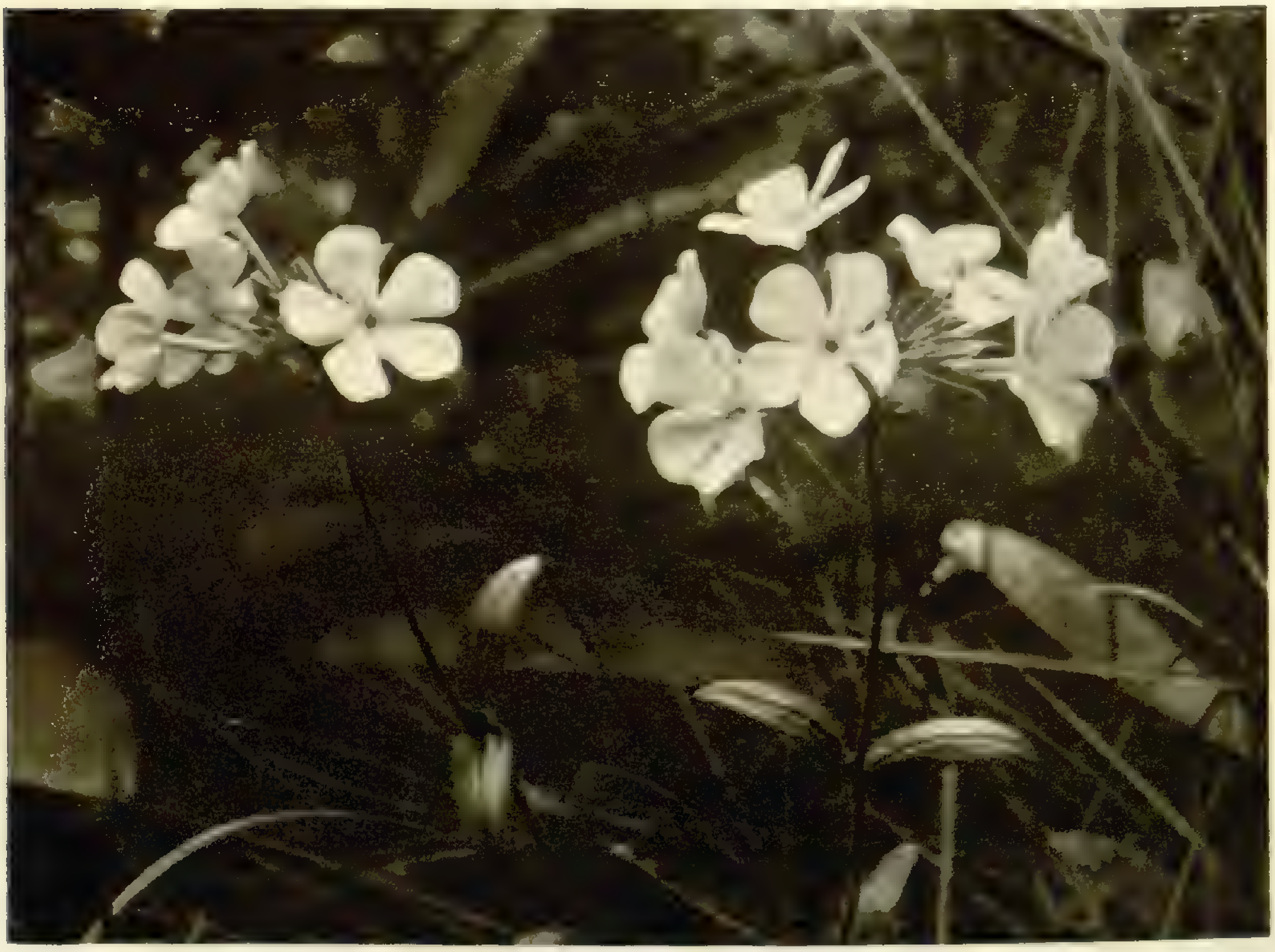

FIG. 2. *Phlox amoena walteri.*
In cultivation; originally from North Carolina.

7. **Phlox amoena** Sims. Hairy Phlox. Plate 3.

History.—This species is recorded to have been discovered by Fraser in 1786, but it was not named until 24 years later. Meanwhile Walter[1] had listed it with a question, and Michaux[2] without question, as *P. pilosa* Linné. In 1810 Sims[3] published a colored plate of it and ventured to give the name now accepted, though considering that "This species of Phlox is too nearly allied to the one figured in the preceding plate," which was the real *P. pilosa.* Pursh[4] endeavored to reach a compromise by proposing the combination *P. pilosa* variety *amoena.* Elliott,[5] on the other hand, returned to Michaux's usage, while Bentham[6] overlooked Sims's name entirely. In the second edition of his Manual, Gray[7] termed the present plant *P. pilosa* var. ? *walteri,* and retained this designation in the following two editions. Chapman[8] was satisfied that the two are distinct species, and made for the present one the new combination *P. walteri;* and Gray[9] then came to the same view, identifying it at first with *P. procumbens* Lehmann,[10] but soon afterward[11] recognizing this as a hybrid, and adopting Sims's name, as required by the rule of priority. In the last cited work, Gray also noted that Nuttall had proposed the name *P. involucrata,* but had never adequately published it.

The only other date of significance in the history of *P. amoena* is 1903, when Small[12] segregated from it a presumably distinct species, under the name *P. lighthipei.* This was reduced to varietal status by Brand[13] (mis-spelled *lightipei*), and reasons for accepting his view will be presented in the discussion of variation in the species.

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[1] Flora Caroliniana 96. 1788.
[2] Flora Boreali-Americana (1): 144. 1803.
[3] Botanical Magazine 32: pl. 1308. 1810.
[4] Flora America Sept. (1): 150. 1814.
[5] Sketch Botany S. C. & Ga. (1): 247. [1817.]
[6] In De Candolle's Prodromus 9: 305. 1845.
[7] Manual of Botany, ed. 2. 331. 1856.
[8] Flora Southern States 339. 1860.
[9] Manual of Botany, ed. 5. 372. 1868.
[10] Index Sem. Hamburg 1828: 17; Linnaea 5: 383. 1830.
[11] Proc. Amer. Acad. Arts Sci. 8: 251. 1870.
[12] Flora Southeastern U. S. 978. 1903.
[13] In Engler's Pflanzenreich IV. 250: 70. 1907.

Geography.—This species has a rather restricted range—from Florida to eastern Mississippi, southern Kentucky, and north central North Carolina. The records of the two recognizable varieties, *Phlox amoena walteri* and *P. a. lighthipei,* are indicated in figure 4 by solid and open circles, respectively. The distribution of these suggests the species to have spread from a dispersal center in the northwestern corner of Georgia or adjacent Alabama. It is probably still expanding its range, there being no indication that the present boundaries are climatic.

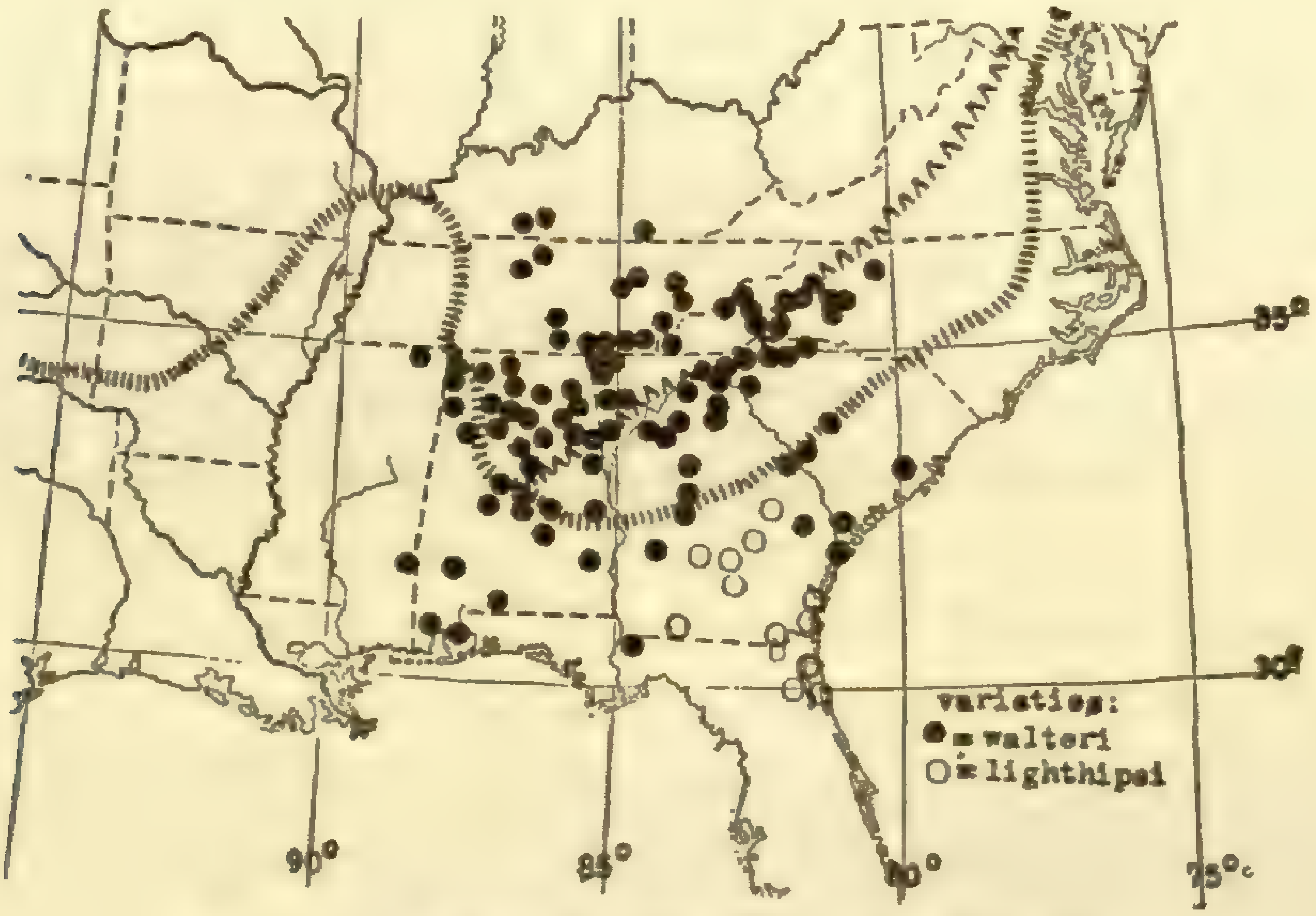

FIG. 4. Distribution of *Phlox amoena.*

ALABAMA: Abundant and wide-spread, being recorded from 33 counties: Autauga, Baldwin, Barbour, Bibb′, Blount′, Calhoun′, Cherokee′, Chilton′, Clarke, Cleburne′, Colbert′, Cullman′, De Kalb′, Elmore′, Escambia, Etowah′, Fayette′, Franklin′, Jefferson′, Lawrence, Lee, Limestone′, Marion′, Marshall′, Mobile, Montgomery′, Morgan′, Perry′, Randolph′, St. Clair′, Shelby′, Walker′, and Winston′.

[ARKANSAS: Ascribed to this state by Mohr,[1] but evidently through misunderstanding.]

FLORIDA: Occasional in the northern part, specimens—chiefly of the southeastern variety—having been seen from Clay, Duval, Gadsden, and St. Johns counties.

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[1] Plant Life of Ala. 686. 1901.

Georgia: Distributed much as in Alabama, the county list being: Bartow′, Bibb′, Bulloch, Camden, Catoosa′, Charlton, Chatham, Clarke, Coffee, Dade, De Kalb′, Emanuel, Floyd′, Fulton, Glynn, Gwinnett, Habersham′, Hall, Haralson, Jasper, Madison′, Peach, Richmond, Stephens′, Sumter, Telfair′, Thomas, Walker′, Wheeler′, and Wilcox. The southeastern variety is present locally.

Kentucky: Enters along the southern border, specimens having been seen from Logan, McCreary′, and Warren counties. Short's records from "barrens" may represent others.

Mississippi: Rare and probably limited to the eastern edge of the state. The records published by Lowe[1] proved, on examination of the specimens in the State University herbarium, to represent mis-identified *P. pilosa*. The localities given on two sheets seen in other herbaria can not be certainly placed, but are thought to lie in Alcorn and Wayne counties.

[Missouri: Mohr extended the range of *P. amoena* to this state, but must have mistaken some other species for it.]

North Carolina: Common in the Blue Ridge and inner Piedmont, but apparently absent from the Coastal Plain. The county list is: Buncombe′, Burke, Caldwell, Catawba, Cherokee′, Forsyth′, Haywood, Henderson′, Iredell, Lincoln, McDowell′, Madison′, and Polk′.

South Carolina: Occurs throughout the southwestern half, there being 10 county records: Aiken′, Anderson, Berkeley, Cherokee′, Greenville′, Jasper, Lexington, Oconee′, Pickens′, and Spartanburg. The type locality of the species was on the Santee Canal in Berkeley.

Tennessee: Frequent except toward the west end, the county list being: Blount, Bradley′, Coffee′, Cumberland, Davidson, Franklin, Hamilton, Knox, Marion′, Monroe, Morgan, Polk′, and Sumner.

[Virginia: In the second edition of his Manual of Botany, Gray[2] ascribed "*P. pilosa* var. ? *walteri*" to Virginia, and this has been copied from one compilation to another ever since. No substantiating evidence is, however, at hand.]

[1] Plants of Miss. 234. 1921.

[2] Manual of Botany, ed. 2. 331. 1856.

[West Virginia: *Phlox amoena* was reported by Millspaugh[1] in Fayette County; no specimens seem to have been preserved, however, and trips to that region have yielded only *P. divaricata.* Mr. L. W. Nuttall, who found the plant in question advises me that its identity was never checked by comparison with herbarium material, and that he regarded it as an introduction from the west. It therefore seems likely to have been some other species.]

Ecology.—The most frequent habitat of the present species is a thin woods in rather sterile soil, although it sometimes extends into deep woods where the soil is richer, and again pushes out into swamp thickets or even boggy meadows. In reaction preference it is to be classed as subacid, and only rarely thrives in circumneutral soils. Its partially persistent stems and rather small hairy leaves mark it as somewhat xerophytic. From the successional standpoint it is intermediate, being exceptional either as a pioneer plant or an occupant of climax forests.

Its blooming period extends from early April through May in the lowlands, and from May into June at higher elevations. The flowers have little scent, evidently attracting insects by their brilliant color. Fertile seeds do not seem to be produced very freely, however, and this species rarely becomes abundant. Its failure to occupy a wider range is perhaps in part connected with this lack of reproductive vigor.

Variation.—Phlox amoena is less variable than most other species, and except toward the southeastern end of its range is rather uniform in aspect. The leaves, which are normally elliptic-oblong and obtusish, show a tendency to become lanceolate and acuminate in many colonies, and in northeastern Florida and southeastern Georgia this tendency is locally dominant; the bracts being also narrowed and the stems elongated, the plants then take on a striking resemblance to those of *P. pilosa* or *P. floridana.* It was material of this kind which, as noted under History, has been considered a distinct species, *P. lighthipei;* but as many intermediates with typical *P. amoena* exist, only varietal separation seems justified.

[1] Living Flora of West Virginia 335. 1913.

The only other noteworthy variation occurs in the corolla-color. This is normally phlox-purple (65 b), but a brilliant hue approaching the true purple (65) of Ridgway is also frequent. The bluer amparo purple (63 b) and the redder mallow purple (67 b) are exceptional. In a few colonies light-colored plants become prominent, their corollas being pink, light violet (59 d), near-white, or even pure white. Intense eye striae, usually rhodamine purple (67), are often present, each lobe bearing near its base either a single broad central stripe, two narrow lateral ones, or both in combination, yielding a striking stellate pattern.

VARIETIES AND FORMS OF PHLOX AMOENA

LEAVES MOSTLY ELLIPTIC-OBLONG AND OBTUSISH; BRACTS BROAD.

Phlox amoena walteri (Gray) Wherry, comb. nov. *P. pilosa* Michaux, not Linné; *P. amoena* Sims; *P. pilosa amoena* Pursh; *P. pilosa walteri* Gray; *P. walteri* Chapman, in part; *P. procumbens* Gray, not Lehmann; *P. involucrata* Nuttall ex Gray. The widespread variety.[1]

Form:

Light-colored (corolla pink, light violet, white, etc.). Typified by specimen from 9 miles southeast of Beechgrove, Coffee Co., Tenn., collected by E. T. W. May 7, 1929. Occasional in many colonies.

LEAVES MOSTLY LANCEOLATE AND ACUMINATE; BRACTS NARROW.

Phlox amoena lighthipei (Small) Brand [spelling corrected]; *P. walteri* Chapman, in part; *P. lighthipei* Small. In Eastern Fla. and Ga.

Cultivation.—Being adapted to growth only in sterile, acid soils, *Phlox amoena* fails to thrive in ordinary gardens, and is not in the trade. Many dealers offer under this name, however, the hybrid more correctly known as *P. procumbens* Lehmann; also listed as "P. verna" Hort. As noted under History, Gray for a time confused this plant with *P. amoena,* but soon corrected the error; in doing so, however, he made another, in that he suggested the parents of the hybrid to be *P. subulata* and *P. amoena.* Actually the spatulate leaves, strongly glandular pubescence, and long style show the second parent to have been *P. stolonifera* instead. Horticulturists who desire to label their plants correctly will do well to remember that "Phlox amoena" Hort. is *not* the *P. amoena* of botanists.

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[1] *P. rugelii* Brand, in Engler's Pflanzenreich IV. 250: 73. 1907 = *P. divaricata canadensis* × *P. amoena walteri.* Ala., Tenn., and N. C.

Henry A. Lang

From the date of his joining the Botanical Club in 1901, Dr. Henry A. Lang was for many years a devoted attender of our meetings. Our older members will recall his narratives of visits to Florida and Jamaica. He was long a frequent visitor to the Academy's Herbarium, and perhaps the writer's most vivid recollection of his early days at the Academy nearly a quarter of a century ago is that of "Heinrich" and Mr. Charles S. Williamson fully absorbed in poring over specimens together. The latter died in 1914, and now Dr. Lang has passed from us on May 27, 1930.

Of recent years Dr. Lang found less time for his hobby, although he still came to the Academy to check the identification of grasses, or to pursue his special project of a flora of the Wissahickon Valley in Philadelphia. The latter plan was one which of late years took him repeatedly through the woods along Wissahickon Creek, and among the memorandum books that he has left is his "Wissahickon Flora Catalog, alphabetisch in genera geordnet, 1923– ." His herbarium and records, donated by his widow to the Academy, show the special attention that he long gave to grasses, sedges and rushes.

A daughter informs us that Dr. Lang commenced his herbarium at the early age of twelve years, and continued adding to it throughout his busy and distinguished professional career. Born in New Orleans October 9, 1854, he early began the special study of music, graduating in 1875 from the conservatory at Stuttgart in Germany. Recognition as a pianist was immediate, and there ensued an extensive European tour followed by years of teaching in German conservatories. Still greater reputation came to him as a composer, and a recent sketch in "The Etude" says: "He has won more important prizes, for musical work in its larger forms, than any other American composer.'' In 1890 he returned to America, settling in Philadelphia for the remainder of his life. Here he continued the production of symphonies that have been played by the orchestras of this and other cities, and in 1911 received the distinction of ''Doctor of Music.''

Few among us, knowing Dr. Lang merely in our Club where we have long counted upon his keen interest and his wide knowledge of plants, would have suspected from his modest presence the extent of his genius in another field. From remarks that he has dropped, it would seem that he loved botany with somewhat of the ardor that he gave to music, although in our science he never ventured to publish any of his records.

John J. Tyler

The Club has lost another member in the death of John J. Tyler, which occurred in Germantown October 28, 1930.

Mr. Tyler was born in Philadelphia April 25, 1851, and spent most of his life in this city. He was a member of the Society of Friends, receiving his early education at Friends' Central School. In 1868–69 he attended Cornell University, graduating in the first class from that institution.

Through his mother Mr. Tyler was a nephew of Minshall and Jacob Painter, who about a century ago planted an arboretum on their estate in Delaware County, about a mile north of the village of Lima. In 1870 he inherited this old home with its choice collection of trees brought from many parts of the world. He and Mrs. Tyler lived there from 1875 to 1879, and he himself became interested in botanical things.

But they soon moved from the seclusion of Painters' Arboretum to Germantown, which was to be their home for fifty years. Yet, although Mr. Tyler lived an active business life quite at contrast with the quiet careers of his uncles, he was ever particular to maintain the integrity of the Arboretum, and was much concerned for its perpetuation.

Being without children, Mr. Tyler has willed his large fortune to establish "The Tyler Foundation," devoted to religious, charitable, educational and scientific projects. While a technicality could prevent his wish from becoming effective, we understand that his widow will carry out this plan.

General Notes

Excursion to the Pymatuning Swamp. Under the guidance of Dr. E. M. Gress, State Botanist, and of Dr. Otto E. Jennings of the University of Pittsburgh, a small party of Pennsylvania botanists spent June 14 and 15 exploring the Pymatuning Swamp in the extreme northwestern part of Pennsylvania. This is a wooded bog, seventeen miles long, that supports a flora rich in plants of northern distribution. Our representatives, Messrs. Hugh E. Stone and Arthur N. Leeds, brought back for the Academy's Herbarium about 100 species of plants, including some choice finds of which several are sorts that had not been heretofore in our collection from that portion of Pennsylvania.

International Botanical Congress. Four members of the Club were present at the sessions of the Fifth International Botanical Congress, held August 16 to 23 at Cambridge University, England. Of these Dr. William Randolph Taylor contributed to the program a paper on cytology. All attended chiefly the meetings of the Taxonomic Section, where much time was devoted to the subject of nomenclature; out of the discussions of this involved but important subject there seems to have come a wide agreement that promises to end the long-standing conflict between the American Code and the International Rules.

Beside the social and scientific experience of the Congress, all our members spent further time in European travel and study. Dr. and Mrs. John M. Fogg, Jr., left Philadelphia in late June, and before the Congress visited Italy, Switzerland, France and Scotland. Mr. Bayard Long, as on his northeastern journeys traveling in company with Professor M. L. Fernald of Harvard University, left in early July; they visited northern Scotland together, coming to England with several species discovered new to the flora of the British Isles; in London they studied critical and early specimens of northeastern North America preserved especially at Kew Gardens and the British Museum of Natural History; and they later made a short visit to the Jardin des Plantes in Paris. Dr. Taylor left Philadelphia in early August, and stayed a month after the Congress to study collections of Marine Algae at the British Museum. Dr. and Mrs. Francis W. Pennell crossed the ocean with him, remaining a slightly longer time in London and later visiting Paris and Brussels; Dr. Pennell studied types of American Scrophulariaceae at Kew Gardens, the British Museum, and the Linnean Society in London, at the Universities of Cambridge and Oxford, at the Jardin des Plantes in Paris, and at the Jardin Botanique in Brussels. They returned to Philadelphia on the first of November.

University of Pennsylvania. We regret the loss from the Botanical Department of the University, and so from attendance at our meetings, of Dr. William Randolph Taylor, who this autumn commences his courses in the University of Michigan at Ann Arbor; Dr. Taylor has become one of the country's leading students of Marine Algae.

We are glad, however, to record the arrival at the University of Dr. Edgar T. Wherry, who becomes Professor of Plant Ecology. For seventeen years Dr. Wherry has been with the Bureau of Chemistry of the United States Department of Agriculture at Washington, the latter part of the time in charge of investigations of soil chemistry in relation to crops. He has done much to call attention to the significance of soil acidity or alkalinity to the distribution of plants, even inventing his own soil-testing apparatus. Knowledge of soil preferences has led on to a knowledge of plants with special regard to their distribution, and the members of our Club have enjoyed his narratives of journeys in search of critical species and appreciated the scientific value of his contributions to "Bartonia." It is a pleasure to have him more intimately associated with us.

Death of Mr. Simpson. Mr. Edwin I. Simpson, since 1907 a member of the Club, died on October 31, 1930. Once he was a familiar figure at the Academy, being from about 1895 until 1918 secretary to the late Dr. Samuel G. Dixon, the Academy's President and State Commissioner of Health.

Death of Dr. Leffmann. As this issue is in press comes the news of the death of Dr. Henry Leffmann in his eighty-second year on December 25, 1930. Though distinguished chiefly for his investigations and critical work in chemistry and medicine, he was keenly interested in botany, having a long acquaintance with the Botanical Section of the Academy and an association of several years with the Philadelphia Botanical Club. A brief sketch of him as a botanist will appear in our next number.

Recent Work in the Local Herbarium. The most notable recent accessions have been plants mounted from the large accumulations of Mr. Bayard Long, the Club's Curator. He had selected from his series his collections from Chester County, Pennsylvania, and from Cumberland County, New Jersey. So valuable both for distributional records and for their high quality are Mr. Long's specimens, that we earnestly hope that his entire series may be added in the next few years.

Cumulative Index. In response to requests, and with a realization of its value in making readily accessible the scientific and historical information of this journal, we are issuing with this number the first cumulative index to "Bartonia." This covers the first ten numbers, summarizing the annual indexes of technical names and presenting for the first time an index to articles and to personal references.

Program of Meetings during 1929

Date	Subject	Speaker	Attendance
Jan. 24	Flora of the Delaware Peninsula	Dr. Robert R. Tatnall	
	Local species of *Lycopodium*	Arthur N. Leeds	20
Feb. 28	Natural hybrids and the possible origin of species from them	Dr. John M. Macfarlane	
	Local species of *Juncus*	Dr. John M. Fogg, Jr.	19
Mar. 28	Botanizing in the Glacier and Yellowstone Parks	Harry W. Trudell	
	Local species of *Ranunculus*	Hugh E. Stone	30
Apr. 25	Flora of Cape May County, New Jersey	Otway H. Brown	
	Botanizing in Cape May County	Dr. Witmer Stone	34
May 23	Rambles in New Zealand, Hawaii, Samoa and the Cook Islands	Dr. Roland Holroyd	
	The Genus *Eleocharis*	Dr. H. K. Svenson	28
Sept. 26	Notable trees and old arboretums in and around Philadelphia	Samuel N. Baxter	
	Reports of summer work by members		29
Oct. 24	Sources of Linnaeus's knowledge of our eastern flora	Dr. Francis W. Pennell	
	Local species of *Eupatorium*	Bayard Long	22
Nov. 21	Botanizing with MacMillan in Labrador and Baffin Land	Dr. Samuel C. Palmer	
	Local species of *Botrychium*	Arthur N. Leeds	39
Dec. 19	Phloxes and other finds of 1929	Dr. Edgar T. Wherry	
	Local species of *Ilex* and *Euonymus*	Dr. John M. Fogg, Jr.	33

Officers and Members of the Philadelphia Botanical Club, 1930

WALTER M. BENNER, *President*
H. E. THOMPSON, *Vice-President*
HUGH E. STONE, *Secretary*
ARTHUR N. LEEDS, *Treasurer*
BAYARD LONG, *Curator*

ACTIVE MEMBERS

	Elected
Joseph W. Adams, 108 West Wishart St., Philadelphia, Pa.	1925
Wharton B. Aucott, 748 Tyson Ave., Ardsley, Pa.	1928
Edwin B. Bartram, Bushkill, Pa.	1906
J. Russell Bebler, 135 E. Phil Ellena St., Germantown, Phila.	1919
Walter M. Benner, 5636 Loretta Ave., Frankford, Philadelphia	1912
Carl E. Bliss, 65 Randolph Place, South Orange, N. J.	1924
Carl Boyer, Wagner Institute, 17th St. & Montgomery Ave., Phila.	1926
J. Claudius Boyle, 223 Kenmore Rd., Brookline, Pa.	1919
Dr. Herman Burgin, 212 High St., Germantown, Philadelphia	1915
James J. Burke, Addingham, Pa.	1919
Milton Campbell, Broad & Wallace Sts., Philadelphia	1928
F. Van Buren Connell, 3620 Baring St., Philadelphia	1924
Joseph Crawford, 16 E. Stewart Ave., Lansdowne, Pa.	Founder
Dr. Herbert J. Darmstaater, 4617 York Road, Philadelphia	1926
Robert R. Dreisbach, Midland, Mich.	1922
Dr. John W. Eckfelt, 502 Kathmere Rd., Brookline, Pa.	1892
Dr. John M. Fogg, Jr., University of Pennsylvania, Philadelphia	1921
George W. Haag, North Wales, Pa.	1924
Arthur M. Henry, U. S. Appraisers Stores, 134 S. 2nd St., Phila.	1927
F. F. Huber, Pennsburg, Pa.	1911
William R. Keeney, St. Davids, Pa.	1930
Dr. Ida A. Keller, 4424 Osage Ave., Philadelphia	1892
Addison D. Kern, 222 West Linton St., Philadelphia	1929
Miss Natalie B. Kimber, 538 E. Locust Ave., Germantown, Phila.	1928
Rev. William U. Kistler, 118 Main St., Pennsburg, Pa.	1911
Prof. W. A. Kline, Ursinus College, Collegeville, Pa.	1911
Dr. Henry A. Laessle, 5900 Market St., Philadelphia	1894
Dr. H. Pearce Lakin, 14 E. Main St., Lansdale, Pa.	1906
Mrs. H. Pearce Lakin, 14 E. Main St., Lansdale, Pa.	1906
Dr. Charles H. LaWall, 43rd St. & Kingsessing Ave., Phila.	1896
Arthur N. Leeds, 5321 Baynton St., Germantown, Philadelphia	Founder
Morris E. Leeds, 5321 Baynton St., Germantown, Philadelphia	Founder

Bayard Long, 250 Ashbourne Rd., Elkins Park, Pa.	1906
Mayne Reid Longstreth, 1420 Chestnut St., Philadelphia	1892
Dr. Donald MacFarlan, Ardmore, Pa.	1929
Samson McDowell, Jr., 4840 Roosevelt Blvd., Philadelphia	1926
Adolf Müller, Box 66, Norristown, Pa.	1920
Dr. Samuel C. Palmer, Swarthmore College, Swarthmore, Pa.	1929
T. Chalkley Palmer, Media, Pa.	1927
Dr. Gideon H. Patton, 61 E. Penn St., Germantown, Philadelphia	1929
Dr. Francis W. Pennell, Moylan, Pa.	1910
Edward Pennock, 3609 Woodland Ave., Philadelphia	1927
Harold W. Pretz, 123 S. 17th St., Allentown, Pa.	1909
John W. Prince, 5439 Berks St., Philadelphia	1924
Evan Randolph, Seminole & Chestnut Aves., Chestnut Hill, Phila.	1917
George Redles, 207 E. Wister St., Germantown, Philadelphia	1917
Dr. W. H. Reed, Jeffersonville, Pa.	1892
Charles C. Roberts, Lansdowne, Pa.	1926
Lee Sowden, 3823 Oak Rd., Germantown, Philadelphia	1901
Dr. D. Walter Steckbeck, University of Pennsylvania, Phila.	1925
Hugh E. Stone, Haverford, Pa.	1892
Dr. Witmer Stone, Academy of Natural Sciences, Philadelphia	Founder
J. Fletcher Street, 1120 Locust St., Philadelphia	1918
Dr. Robert R. Tatnall, 1100 W. 10th St., Wilmington, Del.	1928
Dr. W. Randolph Taylor, Univ. of Michigan, Ann Arbor, Mich.	1921
Arthur H. Thomas, Haverford, Pa.	1928
Mrs. W. Hersey Thomas, 145 E. Gorgas Lane, Mt. Airy, Phila.	1929
Warner R. Thomas, Custom House, Philadelphia	1924
Horace E. Thompson, 5016 Schuyler St., Germantown, Philadelphia	1920
Harry W. Trudell, 2030 E. Madison St., Philadelphia	1915
Prof. Rodney H. True, University of Pennsylvania, Philadelphia	1925
Clarence E. Varnum, Atco, N. J.	1923
Robert F. Welsh, 132 S. 4th St., Philadelphia	1909
C. S. Wertsner, 221 N. 13th St., Philadelphia	1920
Dr. Edgar T. Wherry, University of Pennsylvania, Philadelphia	1925
Hans Wilkins, 241 S. 11th St., Reading, Pa.	1928
William H. Witte, 16 York St., Camden, N. J.	1929
Miss Mary F. Wright, Ambler, Pa.	1928

HONORARY MEMBERS

George W. Bassett, Secane, Pa.	*1904
Samuel Newman Baxter, Fernhill Park, Germantown, Phila.	*1918
Dr. Joseph S. Illick, Mont Alto, Pa.	1925
Samuel S. Van Pelt, 59 Bethlehem Pike, Chestnut Hill, Phila.	*1902

* Elected Active Members on these dates.

CORRESPONDING MEMBERS

Charles C. Bachman, Slatington, Pa.	1908
Mrs. Elizabeth G. Britton, N. Y. Botanical Garden, New York City	1895
Dr. Nathaniel Lord Britton, N. Y. Botanical Garden, New York City	1892
Otway H. Brown, Cape May, N. J.	1908
Stewart H. Burnham, Dept. Bot., Cornell University, Ithaca, N. Y.	1911
Prof. M. L. Fernald, Gray Herb. Harvard University, Cambridge, Mass.	1929
Dr. A. Arthur Heller, Chico, Calif.	1893
Dr. Harold St. John, University of Honolulu, Honolulu, Hawaiian Islands	1927
Charles F. Saunders, Pasadena, Calif.	1893
Dr. John K. Small, New York Botanical Garden, New York City	1893
Dr. Campbell E. Waters, Washington, D. C.	1904
Dr. H. W. Youngken, Mass. College of Pharmacy, Boston, Mass.	1918

RECENTLY DECEASED MEMBERS

	Died
Jacob H. Grove, Active	Feb. 18, 1929
Dr. John W. Harshberger, Active	Apr. 27, 1929
Henry A. Lang, Active	May 27, 1930
Dr. Henry Leffmann, Honorary	Dec. 25, 1930
Dr. Hugh B. Meredith, Active	Aug. 1, 1929
Edwin I. Simpson, Active	Oct. 31, 1930
Willard A. Stowell, Active	Jan. 19, 1929
John J. Tyler, Honorary	Oct. 29, 1930

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No. 13 1931

BARTONIA

PROCEEDINGS OF THE PHILADELPHIA BOTANICAL CLUB

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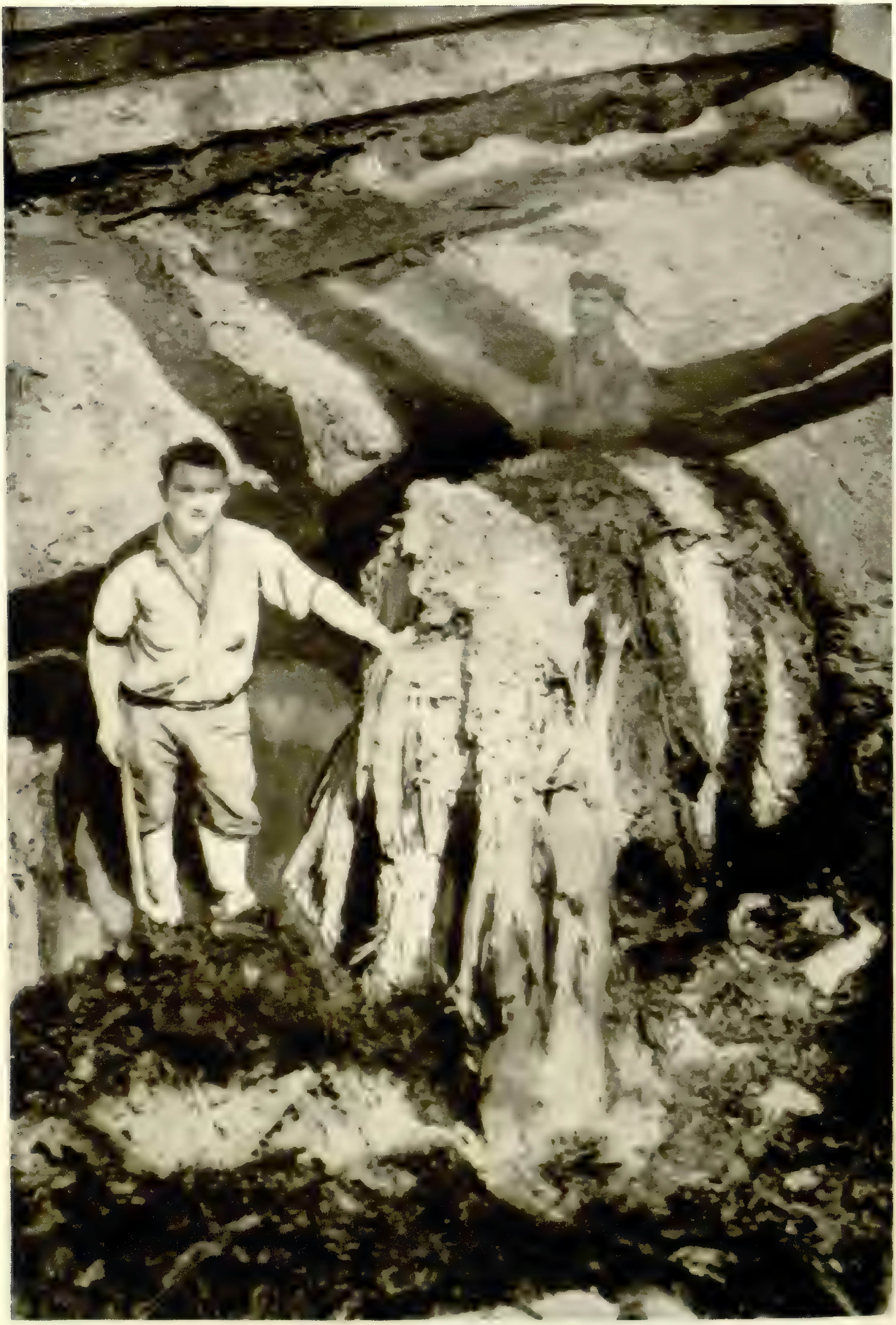

(*Photograph courtesy of Philadelphia Ledger.*)

Excavation at Eighth and Locust Streets, Philadelphia, showing stump of Cypress (*Taxodium distichum*), 17 feet in circumference.

BARTONIA

PROCEEDINGS OF THE PHILADELPHIA
BOTANICAL CLUB

No. 13 PHILADELPHIA, PA. 1931

The Subway Tree—A Record of a Pleistocene Cypress Swamp in Philadelphia[1]

HORACE G. RICHARDS

Considerable interest was aroused recently over the finding of tree stumps in the excavations for the subway at 8th and Locust Streets, Philadelphia. Early in the spring of 1931 some pieces of partially carbonized wood were found, but it was not until July that the striking finds were made. Early in that month workmen encountered some 2,800 cubic yards of swamp sod; imbedded in this at various intervals were the well preserved stumps of trees. All the stumps were in an upright position, suggesting that they had been found in place. The locality was 38 feet below the surface of the street and 10 feet below sea-level.

Henry H. Quimby, consulting engineer of the Golder Company, immediately notified the Academy of Natural Sciences of Philadelphia, whereupon Samuel G. Gordon and Horace J. Hallowell, of the Department of Mineralogy, visited the locality and took a little of the material to the Academy for study. The next day they returned accompanied by Dr. H. A. Pilsbry and Arthur N. Leeds. Mr. Leeds recognized the tree as bald cypress (*Taxodium distichum*).[2] Well preserved pneumatophores or "knees" were observed surrounding the great stump, and a large collection of them was taken to the Academy and placed on exhibition where they have attracted much attention.

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[1] Published with the permission of the Secretary of the Smithsonian Institution.

[2] Certain newspaper accounts quoted Professor S. J. Record, of Yale University, as saying that the wood was *Sequoia*. Professor Record writes that he is convinced that it is *Taxodium* and not *Sequoia*.

There was some question as to whether the trees were of historical or geological age, it having been suggested that a cypress swamp may have existed in the Philadelphia region prior to the leveling of the city. However, a brief research into early accounts and maps of the region has failed to indicate such a possibility. Watson describes the original site of the Philadelphia region in detail, mentioning numerous ravines and swamps, but none in the vicinity of 8th and Locust Streets.

Both Watson[3] and Peter Kalm mention numerous buried stumps in the Philadelphia area found at about the same depth as the "Subway Tree," many of these stumps being described as petrified. If the term "petrified" is used correctly, a geological rather than an historical age is certainly suggested. Again, the fact that the cypress stumps were found 10 feet below sea-level seems to preclude the suggestion that the trees are only of historical age.

It seems probable that the trees grew prior to the last (Wisconsin) glaciation, when the Delaware River was an arm of the sea and the Philadelphia area was a low swampy region not unlike the Dismal Swamp of Virginia and North Carolina to-day. The melting of the ice sheet, of which the terminal moraine was only 50 miles north of Philadelphia, undoubtedly caused an immense flow of water carrying with it sand, gravel, and mud, which would have completely buried the swamp.

In the excavation at about the same depth as the tree was observed the blue clay frequently called the Philadelphia Blue Clay. Mr. Frank J. Keeley examined it for diatoms, but found none. There was also blue clay below the tree. This clay is usually associated with the Pensauken Formation (see Strock, 1929), but there are also clay lenses in the Cape May Formation which overlies the Pensauken. The Cape May

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[3] See Hazard edition (1909) 1: 441–443; 2: 422–427.

Formation is present along the coast of New Jersey and extends up Delaware Bay and River. Because of the shallowness of the excavations, it is suggested that the trees came from the Cape May Formation. Even if the clay proves to be of Pensauken age, roots of trees of a later age might possibly be found in the formation.

According to the New Jersey Geological Survey (Salisbury and Knapp, 1917) and the Philadelphia Folio (1909), the formation dates from the climax of the Wisconsin glaciation. Antevs (1928, 1929) points out that such a dating is impossible; at least part of the formation is of marine origin (the part adjoining the Atlantic Ocean) and at the climax of the Wisconsin glaciation sea-level was lowered some 300 feet due to the removal of the water to form the land ice; consequently the shore-line must have been some 80 miles farther east than it is to-day; therefore the Cape May Formation can not date from this stage, but rather from the interglacial stage prior to the Wisconsin when the sea covered the margins of the present shore-line.

Recently the writer (Richards, 1930, 1931 and MS.) has round a large fauna of warm water forms in the Cape May Formation near the present shore-line, thus adding weight to the view of Antevs that the formation dates from the warm interglacial stage prior to the Wisconsin glaciation.

The glacial dating of the formation was based on the seeming continuity of the lower Cape May terraces with terraces along the Delaware River made up of the "Trenton gravel," definitely of glacial age. This seeming continuity may not be real. There might be an imperceptible mingling of the older Cape May terraces and the glacial terraces near the level of the zero isobase, somewhere in the vicinity of Philadelphia.

The finding of a grove of cypress, which now ranges only from southern Delaware southwards,[4] lends further support to the view that the Cape May Formation is of interglacial rather than glacial age. The swamp probably existed near the margin of the marine invasion. That marine conditions existed in the Philadelphia region at the time of the deposition of the Cape May Formation is suggested by the presence of salt-water diatoms in excavations in the eastern part of Philadelphia adjoining the Delaware River, reported by Woolman (1890). Peter Kalm (1753)[5] repeatedly mentions the occurrence of oyster shells and other remains of marine life in excavations at Raccoon (now Swedesboro), New Jersey, on the Delaware, some 15 miles below Philadelphia.

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[4] *Taxodium* has been reported from Cape May County, N. J. (Stone, 1911); Hackensack Meadows, N. J. (Torrey, personal communication), and Manitou, N. Y. (Torrey, 1931), but these stations are usually regarded as due to introduction rather than as native.

At Fish House, Camden County, N. J., a flora and fauna (freshwater bivalves) suggesting a climate somewhat warmer than the present, were found in clay pits (Berry, 1910; Baker, 1920). These deposits have never been definitely dated, but it seems possible that the material was deposited by the Delaware River during the same warm interglacial stage, when the course of the river was somewhat different from the present.

Although *Taxodium* is to-day confined essentially to the warmer portions of the eastern United States, ranging from Florida and the Gulf States north to southern Delaware, its presence in the Philadelphia local areas previous to the late glacial period need not necessarily be taken as evidence of a warmer climate at that time. Many plants formerly at home in this part of the country (as is shown by fossil evidence) but "forced southward" by the ice, have failed completely to regain their northerly ranges since Wisconsin times, but have remained restricted to regions far to the south of the terminal moraine. That these plants are potential constituents of our modern flora, is shown by the success in cultivation of such genera as *Magnolia* and *Robinia,* which formely enjoyed a wide-spread northern distribution, but whose natural ranges to-day center about the southern Appalachians. Indeed, the bald cypress itself is a tree easy of cultivation as far north as New York.

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[5] See especially 1: 357–359; 2: 120, 133–137 of English edition of 1770–1771.

A find quite similar to that of the "Subway Tree' was made in Washington, D. C. in August, 1922, in the excavations for the Walker Hotel (now the Mayflower) at Connecticut Avenue and De Sales Street, N. W. (See Wentworth, *et al.*, 1924). Excavations made to the depth of 35 to 40 feet (10 to 15 feet above sea-level) disclosed a cypress swamp deposit. Here, as in the case of the Philadelphia swamp, an historical age was suggested, but the weight of the argument was decidedly against it. The diatoms studied by Dr. Albert Mann suggested great antiquity and the study of the flora made by Dr. Edward Berry also favored a geological age and suggested a climate slightly warmer than the present in Washington.

Dr. Wentworth in discussing the age of this deposit refers it to the Wicomico stage of the Pleistocene, and suggests that it may have been formed in the last (Peorian) interglacial stage or before. The Wicomico (= Pensauken of New Jersey) has recently been referred to the interglacial stage prior to the Peorian. It may be that the two swamp deposits are of the same age, it sometimes being rather difficult to distinguish between the boundaries of formations in excavations such as the ones in question.

Another example of buried wood, although probably considerably younger than the "Subway Tree," is the cedar swamps of Cape May County, N. J. Here white cedar logs (*Chamaecyparis thyoides*), at least several thousand years old, have been "mined." (See Cook, 1857 pp. 57–65). This wood was perfectly preserved and was formerly used for shingles (Cook, pp. 76–83).

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"Polygala verticillata" in Eastern North America

FRANCIS W. PENNELL

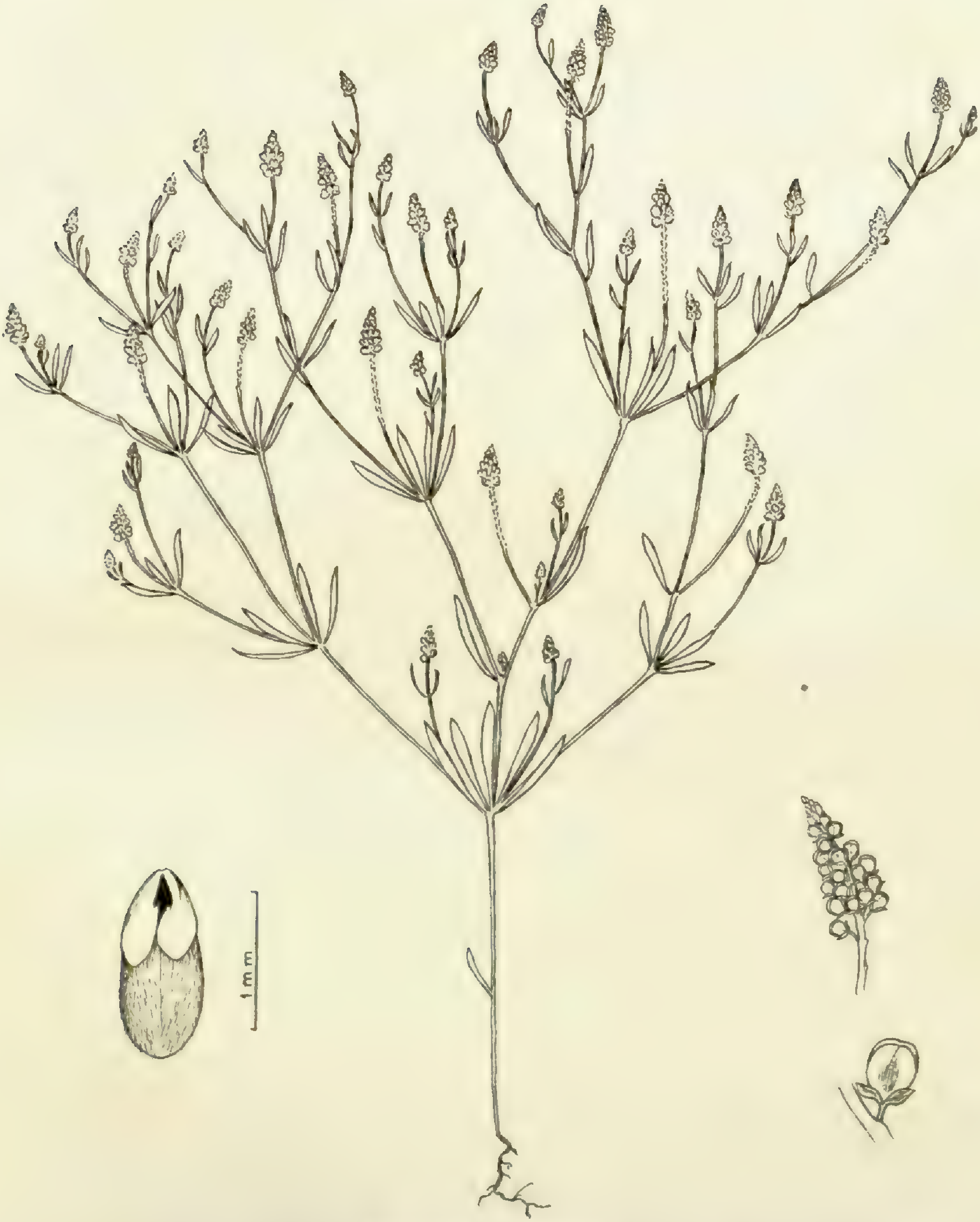
The genus *Polygala* includes a goodly number of species in the eastern United States, and all of these have been long recognized as sharply marked and taxonomically satisfactory entities with the sole exceptions of *P. verticillata* L. and *P. ambigua* Nutt. Between these two, height of plant and color of flowers have in one manual been considered as of specific, in another as of only varietal value. Yet as I have long known these plants near Philadelphia they seemed excellently separated both in structure and in occurrence, but it would have been impossible to have satisfactorily divided any extensive series of herbarium specimens by the criteria that I should have wished to use. *P. ambigua* might have been distinguished, but *P. verticillata,* in spite of its uniform growth on the Serpentine Barrens of southeastern Pennsylvania and along the New Jersey coast, would have remained an unsatisfactory mixture of delicate lax plants with larger stiffer ones.

It was this difference in branching and in the size of flowers that arrested my attention when comparing recently my collections of supposed *Polygala verticillata* from the Piedmont Plateau district of eastern Pennsylvania and the Hudson Valley of New York with those from the areas just mentioned. No flowering plant could be less conspicuous than *P. verticillata* as I had known it on the Serpentine and along the coast, yet I found myself asked to view it as identical with a fine upstanding white- or purplish-flowering plant of the base of the mountains. A solution of the problem that others had long made was to account the inland plant as *P. ambigua,* but fortunately, or unfortunately for a rapid conclusion of the matter, I knew that that species was very different. Putting *ambigua* aside, and seeking for characters of contrast between inland and coastal plants passing as "verticillata" I found no lack of correlated characters, involving capsule and seeds as well as the habit. There were clearly two species in what has been called recently by that name, and therefore actually three species of this little group in the eastern United States: *P. verticillata* L., *P. ambigua* Nutt., and the plant described below as *P. pretzii.*

While not wishing to undertake any detailed study in the Polygalaceae, it has seemed desirable to follow the matter sufficiently to check the constancy of characters over a large area as well as to discover approximately the range of each species. Accordingly specimens have been reviewed, kindly loaned from the United States National Museum, the New York Botanical Garden, the Gray Herbarium of Harvard University, and from Mr. Charles C. Deam, of Bluffton, Indiana, as well as those preserved in Philadelphia, at this Academy and at the University of Pennsylvania. With nearly perfect constancy characters have held true, so that we may now consider that this supposedly puzzling alliance divides into species as sharply marked as are usual in *Polygala.* The geographic information gathered from the specimens studied will appear under each species, where the distribution is summarized by listing counties under states. Lack of space prevents the citation of specimens, although for those of my own collecting the numbers are given.

The only exceptions to the constancy of characters separating *Polygala verticillata* and *P. pretzii* lie in the central Mississippi Valley, where occurs a plant resembling the former in leaves verticillate throughout, in short peduncles and tight flower-clusters (due to short pedicels), and usually also in the finely pubescent seeds; but is like the latter in size of plant and of flowers and fruits. Lying quite without the range of *P. pretzii,* which it resembles only in points of size, the fundamental kinship to *P. verticillata* must be recognized. It is accordingly described below as a variety of that species.

For the habit sketches reproduced on the accompanying plates I am indebted to the pen of Mr. Hugh E. Stone, and for the detailed drawings of the inflorescence and seed to the Academy's artist, Miss Helen E. Winchester.



Polygala verticillata

Habit and inflorescence from specimen collected by Bayard Long (No. 4451) at West Cape May, New Jersey; seed from collection by Albert Commons at Wilmington, Delaware.

Raceme seemingly conic, the fruits quickly falling so that the flowers and fruits present are crowded into a space 0.5–1.5 cm. long; ''wings'' shorter than the mature capsule; seed about twice as long as wide, the aril usually over half its length; leaves mostly or wholly verticillate.

Seed finely pubescent; capsule on a pedicel ¼ to ⅓ its length; raceme narrow, dense, the sepals greenish-white; plant with widely spreading branches and the racemes on peduncles 0.5–4.0 cm. long.

Capsule about 1 mm. long; plant usually 1–2 dm. tall. *P. verticillata*

Capsule about 1.5 mm. long; plant usually 1.5–3 dm. tall. *P. v. sphenostachya*

Seed hirsute; capsule about 1.5 mm. long, on a pedicel ⅓ to ½ its length; raceme wider and looser, the sepals often purplish; plant usually 2–3 dm. tall, with ascending branches and the racemes on peduncles 2–7 cm. long.......... *P. pretzii*

Raceme long-cylindric, slender, the fruits more persistent so that the flowers and fruits present are scattered (the lower remote) in a slender raceme 1–5 cm. long; ''wings'' about equaling the mature capsule; seed mostly thrice as long as wide, the aril usually less than half its length; leaves mostly or all alternate or scattered on the stem and virgate branches.......... *P. ambigua*

Polygala verticillata Linné. Plate 2.

Polygala verticillata L., Spec. Plant. 706. 1753. ''Habitat in Virginia.'' The association of synonyms under this species dates to 1749, when in the thesis of Linné's pupil, Jonas Kiernander, on ''Radix Senega'' various species of *Polygala* were considered; this thesis was reprinted in the ''Amoenitates Academicae'' 2: 139. 1751. Kiernander cited from Plukenet and from Ray two polynomial names describing a small species with leaves whorled in fours and with small whitish spikes of flowers; both of these were evidently the first species of the above key. Of these one was also well figured, showing leaves whorled in fives as well as fours; this was Plukenet's ''Polygala Mariana, quadrifolia, minor, spica parva albicante, a Doctore Krieg, accepimus,'' as entered in his ''Mantissa'' 153. 1700 and illustrated on tabula 438, fig. 4. But along with these Kiernander also cited a plant of Gronovius' ''Flora Virginica'' 172, 1743, described as having filiform stems and alternate leaves and based upon Clayton's number 563 from Virginia; this specimen, preserved at the British Museum of Natural History, is the plant considered last on the above key, *P. ambigua* Nutt. Kiernander's diagnosis would be inadequate to decide between these two, but Linné, who quoted all these citations, introduced into his diagnosis in 1753 the description of the leaves as verticillate and from this named his species, thus seeming to select the first component. But still a further complication is introduced by the fact that by 1753 Linné had acquired for his herbarium the single specimen placed by him under this name; this came from Kalm, who collected in Pennsylvania and northward, and it was the second species of the key, named above *P. pretzii.* A plea might be made that it should be accounted the basis of *Polygala verticillata*, but against this is the fact that Kalm's plants were received so late as often to have had little influence on Linné's decisions and especially the further fact that it does not so well fit the Linnean diagnosis as does the first species of our key; the latter shows more perfectly the verticillate phyllotaxis and much better the remote disposition of the racemes. Accordingly I think that we may consider that Linné's selection of name and the characters of his diagnosis were in all probability based upon Plukenet's polynomial and figure, so that Dr. Krieg's Maryland specimen in the British Museum of Natural History becomes the type of *P. verticillata.*

Plant annual, glabrous throughout. Stem 1–3 dm. tall, erect, with few to many widely spreading-ascending branches, striate-angled. Leaves all in whorls of 3 to 7, only the uppermost occasionally opposite or scattered, the sessile blades 1–2.5 cm. long, linear-lanceolate, narrowed at base and to the acute tip, entire. Racemes actually 15–40 mm. long, although by dropping of ripened fruits apparently only 5–12 mm. long

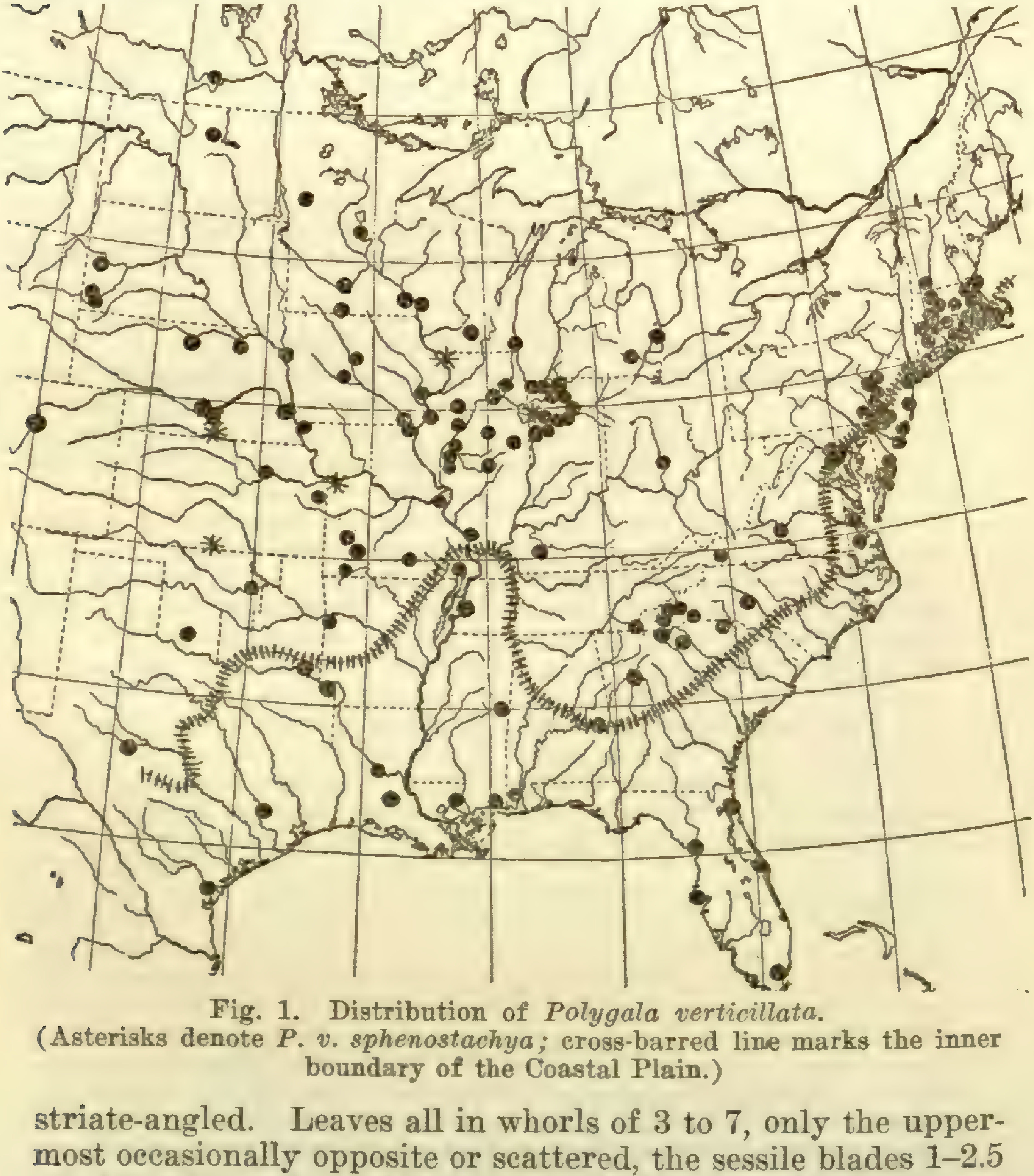


Fig. 1. Distribution of *Polygala verticillata.*
(Asterisks denote *P. v. sphenostachya;* cross-barred line marks the inner boundary of the Coastal Plain.)

and conic. Fruiting pedicels very short, 0.1–0.3 mm. long. Sepals persisting, white or greenish-white: 3 narrowly ovate, 0.3–0.6 mm. long; 2 "wings" 0.9–1.2 mm. long, short-clawed, oval, somewhat shorter than the capsule. Petals deciduous, united: "keels" yellowish or yellow, distally crested with slender horn-like processes. Capsule[1] 0.9–1.2 mm. long, flattened, emarginate. Seeds 1.0–1.3 mm. long, black, with appressed very short brown hairs; with white bifid aril usually ½ to ¾ the length of the seed.

Moist sandy soil, edges of salt marshes, grassy flats over serpentine rock, etc., Massachusetts to Manitoba and Colorado, south to Florida and Texas. Flowering near Philadelphia from early July to October.

Seen from the following states and counties: MANITOBA—Lansdowne; VERMONT—Windham; MASSACHUSETTS—Barnstable, Bristol, Essex, Franklin, Hampden, Hampshire, Middlesex, Norfolk, Plymouth, Suffolk, and Worcester; RHODE ISLAND—Kent, Newport, Providence, and Washington; CONNECTICUT—Hartford, Litchfield, New Haven, New London, and Tolland; NEW YORK—Chemung, Kings, Nassau (8313), Richmond, and Suffolk; NEW JERSEY—Atlantic, Bergen, Camden, Cape May (4024), Gloucester, and Ocean; PENNSYLVANIA—Bucks, Chester (307), Delaware (20), Lehigh, Montgomery, Northampton, and Philadelphia; DELAWARE—Newcastle (7806), and Sussex; MARYLAND—Cecil, Montgomery, Prince Georges, Wicomico, and Worcester; DISTRICT OF COLUMBIA; VIRGINIA—Arlington, Campbell, James City, Nansemond, and Wythe; NORTH CAROLINA—Buncombe, Carteret, Cherokee, Haywood, Jackson, Polk, and Rowan; SOUTH CAROLINA—Anderson, and York; GEORGIA—DeKalb, and Rabun; FLORIDA—Brevard, Dade, Duval, Levy, and Pinellas; ALABAMA—Lee, and Mobile; MISSISSIPPI—Harrison, and Noxubee; TENNESSEE—Lauderdale; KENTUCKY—Muhlenberg; OHIO—Ross; INDIANA—Cass, Lake, Marshall, Miami, Porter, St. Joseph, Starke, Tippecanoe, Wabash, Warren, and White; ILLINOIS—Cass, Champaign, Henderson, Jackson, Lasalle, Macon, Mason, Mc-

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[1] Capsule-measurements are of the apparent size of the mature capsules, from which the ripe seeds characteristically protrude.

Lean, Morgan, Peoria, Stark, and Will; MICHIGAN—St. Clair, and Washtenaw; WISCONSIN—Dane, LaCrosse, and Racine; MINNESOTA—Faribault, Mille Lacs, Nicollet, Ottertail, and Winona; NORTH DAKOTA—Custer, Fall River, and Meade; IOWA—Dallas, Muscatine, Story, Van Buren, and Woodbury; NEBRASKA—Brown, Buffalo, Cass, Kearney, and Knox; MISSOURI—Atchison, Barry, Clark, Greene, Jackson, Polk, St. Louis, Shannon, and Stoddard; KANSAS—Miami, and Riley; ARKANSAS—Sebastian; OKLAHOMA—Comanche, McCurtain, and Payne; LOUISIANA—Rapides, St. Landry, and St. Tammany; TEXAS—Bowie, Nueces, Tom Green, and Waller; COLORADO—Denver.

Polygala verticillata sphenostachya Pennell, var. nov.

Structurally like the species, differing only in larger size of plant and especially of flowers and fruits (Floribus et fructubus majoribus diversa).

Type, barrens, Swope Park, Missouri, collected in flower and fruit July 21, 1915, by B. F. Bush 7692; in the United States National Herbarium.

Perhaps rather to be considered as an unusual large form.

Occasional through the western part of the range of *Polygala verticillata* L., from Indiana to Nebraska and Kansas.

Seen from the following states and counties: INDIANA—Newton (Deam 21512); ILLINOIS—Jo Daviess (Umbach); NEBRASKA—Franklin (T. A. Williams) and Kearney (Hapeman); MISSOURI—Jackson (Bush 7692); KANSAS—Barber (Rydberg & Imler 658).

Polygala pretzii Pennell, sp. nov. Plate 3, fig. 1.

Plant annual, glabrous throughout. Stem 1.5–4 dm. tall, erect with many rather virgately ascending branches, striate-angled. Leaves in whorls of 3 to 5, the upper or sometimes mostly scattered, the sessile blades 2–3 cm. long, narrowly lanceolate, narrowed at base and to the attenuate tip, entire. Racemes actually 20–30 mm. long, although by dropping of ripened fruits apparently only 10–15 mm. long and conic. Fruiting pedicels usually 0.5–1.0 mm. long. Sepals persisting, white or somewhat pinkish: 3 ovate, acute, 0.5–0.7 mm.

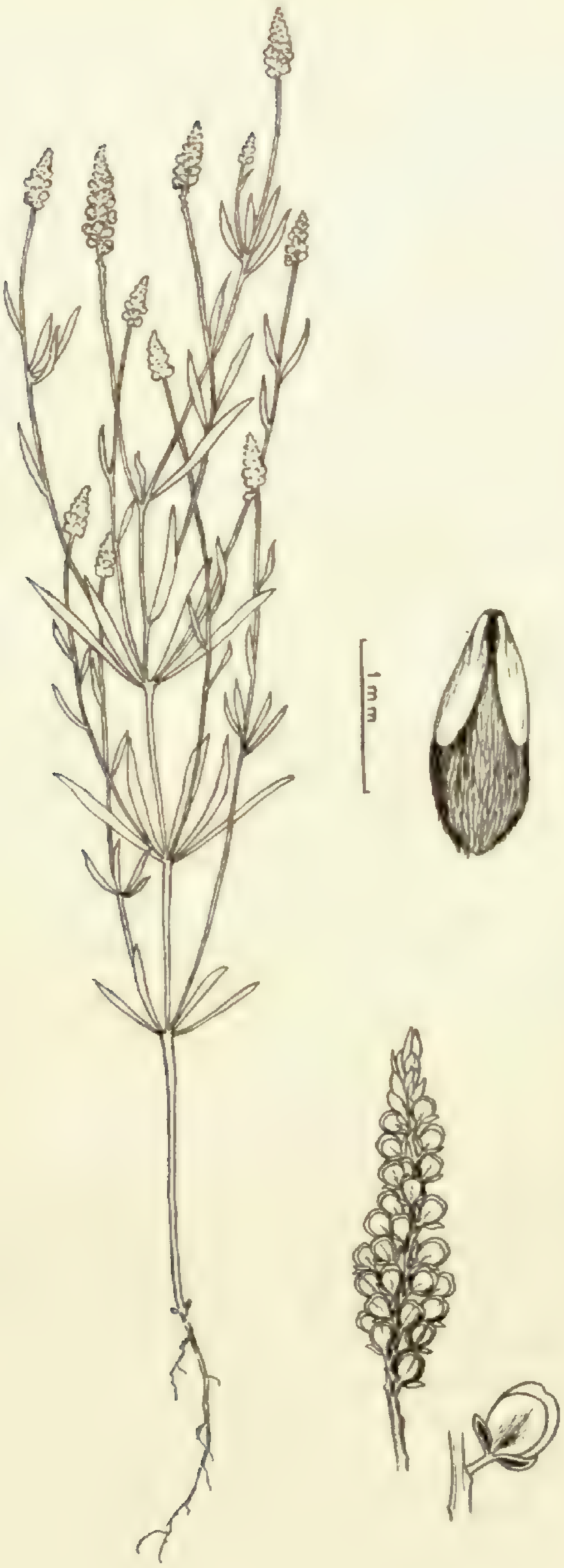

FIG. 1.

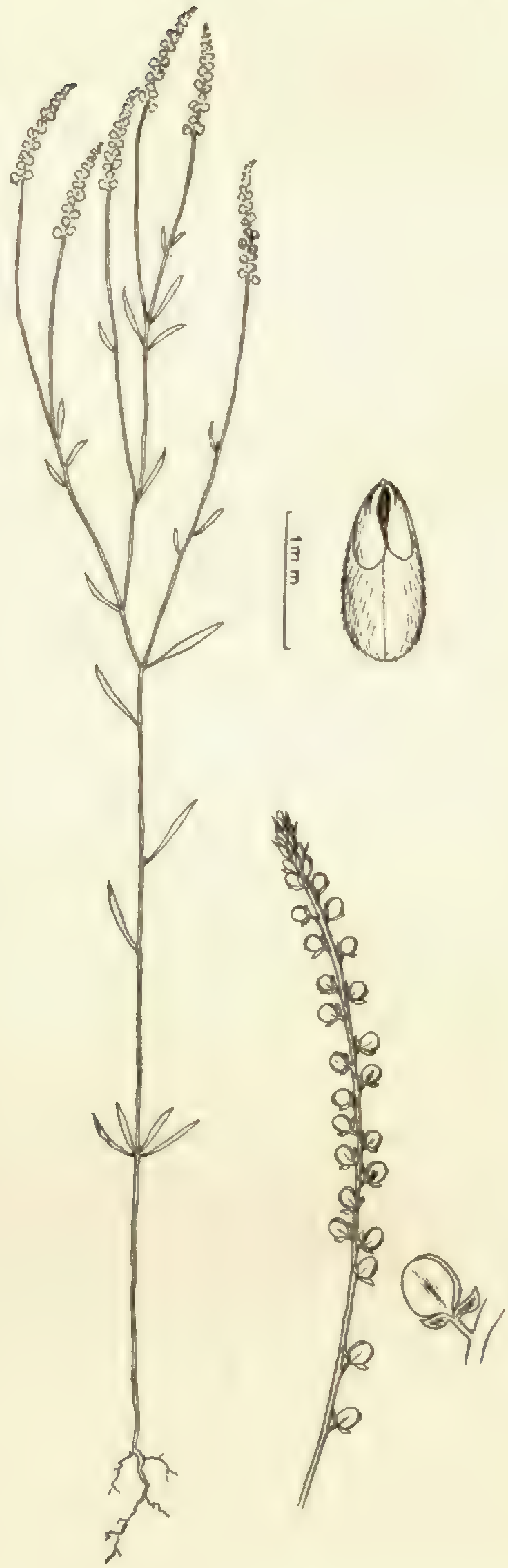

FIG. 2.

Fig. 1. *Polygala pretzii.* Habit from specimen collected by Harold W. Pretz (No. 7597) near Centre Valley Station, Lehigh County, Pennsylvania; inflorescence and seed from collection by S. S. Van Pelt at Johnsonville, Northampton Co., Pennsylvania.

Fig. 2. *Polygala ambigua.* Habit and seed from specimen collected by W. H. Leibelsperger (No. 350) near Moselem Springs, Berks Co., Pennsylvania; inflorescence from collection by Mary H. Williams at Secane, Delaware Co., Pennsylvania.

long; 2 "wings" 1.2–1.5 mm. long, short-clawed, oval, somewhat shorter than the capsule. Petals deciduous, united: "keels" yellow (or proximally pinkish), distally crested with slender horn-like processes. Capsule about 1.5 mm. long, flattened, emarginate. Seed 1.5–1.8 mm. long, black, with appressed or slightly spreading relatively long brown hairs; with white aril usually ½ to ⅔ the length of the seed.

(Planta annua, glabra, ramosa, 1.5–4 dm. alta. Folia verticillata, anguste lanceolata, integra, 2–3 cm. longa. Racemi 20–30 mm. longi, sed ut videtur 10–15 mm. longi et coniciformes. Pedicelli 0.5–1.0 mm. longi. Calyx persistens, laciniis tribus ovatis, acutis, 0.5–0.7 mm. longis, et laciniis duobus ("alis") 1.2–1.5 mm. longis, ovalibus, albis purpuratisve, quam capsulam brevioribus. Petala juncta; carina fulva, cristata. Capsula 1.5 mm. longa, emarginata. Semina 1.5–1.8 mm. longa, hirsuta, arillo bifido ½ vel ⅔ longitudine seminis.)

Type, old field slope near road about 3⅜ miles east by southeast of Centre Square, Allentown, Lehigh Co., Pennsylvania, collected in flower and fruit August 22, 1920, by Harold W. Pretz 10381; in Herb. Academy of Natural Sciences of Philadelphia.

It gives me especial pleasure to dedicate this species to Mr. Pretz in recognition of his careful study of the flora of Lehigh County, Pennsylvania. Just how thorough that study has been (as well as the appropriateness of this plant bearing his name) may be seen from his having gathered *Polygala pretzii* at sixteen places in that county, as represented by specimens deposited at the Academy of Natural Sciences. *P. verticillata* and *P. ambigua* have also been gathered by him in Lehigh County, but only at four localities each.

Meadows and sandy slopes, Maine to southern Michigan and eastern Tennessee. Flowering in Pennsylvania from July to October.

Seen from the following states and counties: Ontario—Lincoln, Welland, and York; Maine—Cumberland, Hancock, Oxford, Penobscot, and York; New Hampshire—Cheshire, Rockingham, and Strafford; Vermont—Bennington and Windham; Massachusetts—Berkshire, Bristol, Essex, Franklin, Hampden, and Worcester; CONNECTICUT—Fairfield (8586), Hartford, Litchfield, Middlesex, New Haven, New London, and Windham; NEW YORK—Bronx (7501), Broome, Cayuga, Columbia, Dutchess (8444), Essex, Monroe, New York, Orange, Putnam (8673), Richmond, Rockland (9200),

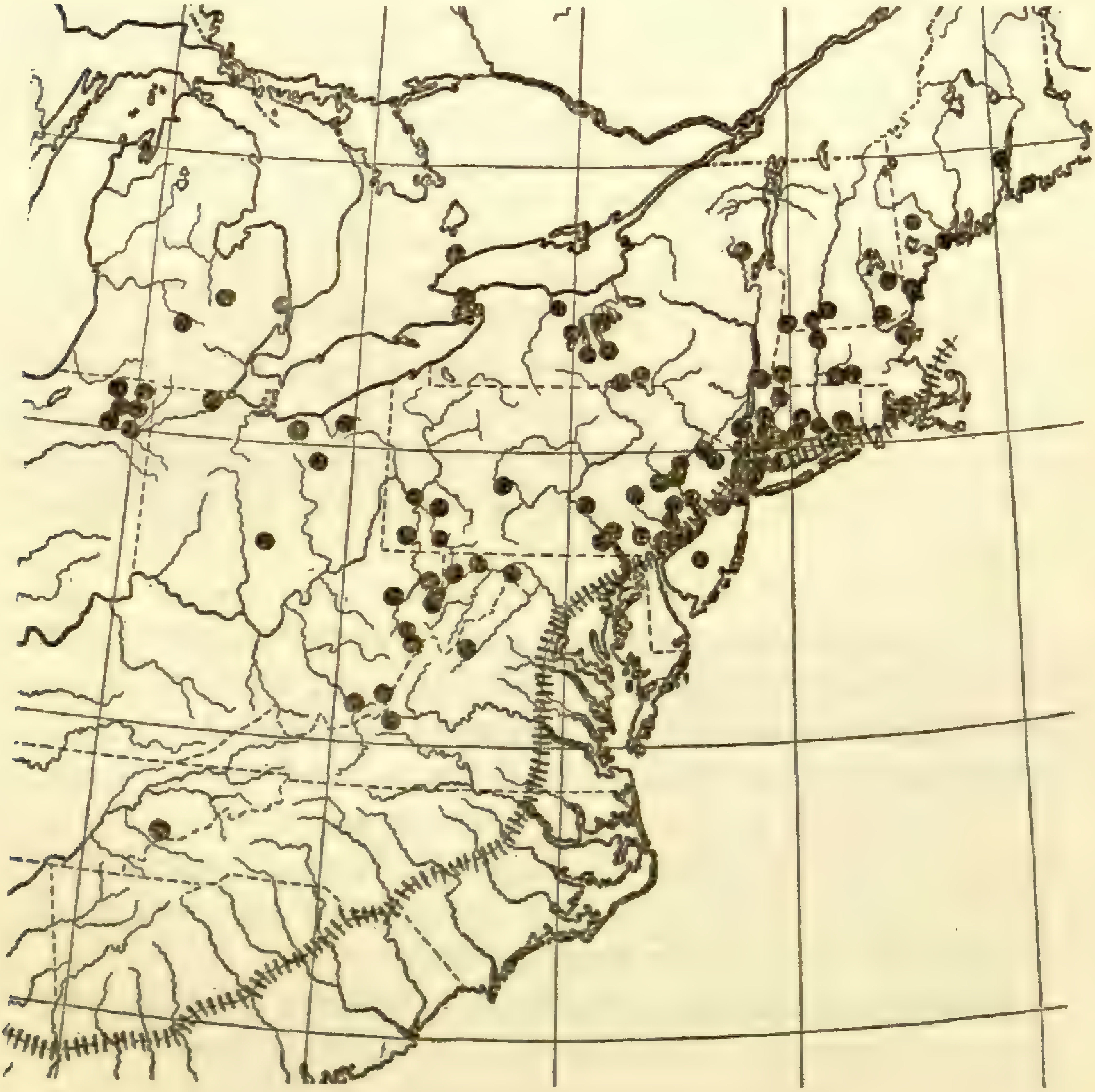

Fig. 2. Distribution of *Polygala pretzii.*

Schuyler, Tioga, Tompkins, Westchester, and Yates; NEW JERSEY—Bergen, Camden, Hudson, Hunterdon, Middlesex, Morris, and Sussex; PENNSYLVANIA—Allegheny, Berks (8751), Blair, Bucks, Chester, Dauphin, Delaware (5068), Fayette, Greene, Lancaster, Lehigh, Monroe, Montgomery, Northampton, Philadelphia, Westmoreland, and York; MARYLAND—Allegheny and Garrett; VIRGINIA—Craig and Rockingham; WEST VIRGINIA—Greenbrier, Morgan, Pocahontas, Preston, Randolph, Summers, Tucker, and Upshur; TENNESSEE—Blount; OHIO—Fairfield, Lorain, Lucas, Portage, and Stark; INDIANA—Allen, DeKalb, Lagrange, Noble, Steuben, and Whitley; MICHIGAN—Genesee, Ingham, and St. Clair.

Polygala ambigua Nuttall. Plate 3, fig. 2.

Polygala ambigua Nutt., Gen. N. Amer. Plant. 2: 89. 1818. "In New Jersey and Virginia; in forests and on roadsides near ditches, abundant." Type seen in Herb. Academy of Natural Sciences of Philadelphia.

Plant annual, glabrous throughout. Stem 1.5–4 dm. tall, erect, with few to many virgately ascending branches, striate-angled. Leaves, the lower often in whorls of 2 to 5, the upper or sometimes all the leaves scattered, the sessile blades 0.5–2.0 (–3.0) cm. long, linear, narrowed at base and to the acuminate tip, entire. Racemes actually 30–100 mm. long, although by dropping of ripened fruits apparently 10–50 mm. long and very slender. Fruiting pedicels 0.4–0.7 mm. long. Sepals persisting, white or somewhat purplish: 3 ovate, obtuse, 0.6–0.8 mm. long; 2 "wings" 1.3–1.5 mm. long, short-clawed, widely oval or circular, about as long as the capsule. Petals deciduous, united: "keels" yellow, distally crested with slender horn-like processes. Capsule 1–1.3 mm. long, flattened, emarginate. Seed 1.3–1.5 mm. long, black, with appressed brown hairs; with white bifid aril usually ⅓ to ½ the length of the seed.

Open sandy soil, barrens and mountain ridges, Maine to Alabama, west to Missouri and Oklahoma. Flowering in Pennsylvania from late June to October.

Seen from the following states and counties: MAINE—Cumberland and Franklin; NEW HAMPSHIRE—Hillsborough; MASSACHUSETTS—Hampden; RHODE ISLAND—Kent; CONNECTICUT—Tolland; NEW YORK—St. Lawrence and Tioga; NEW JERSEY—Atlantic, Camden, Cape May, Mercer, and Morris; PENNSYLVANIA—Adams, Allegheny, Berks, Bucks, Chester (1848), Dauphin, Delaware, Franklin, Fulton, Lancaster, Lehigh, Montgomery, Northampton, and Philadelphia; DELAWARE—Newcastle; MARYLAND—Anne Arundel, Baltimore, Cecil, Garrett, Montgomery, and Prince Georges; DISTRICT OF COLUMBIA; VIRGINIA—Arlington (2469), Bedford, Campbell, Craig, Greene, Hanover, Montgomery, Page, Pulaski, Rockland, and Wythe; WEST VIRGINIA—Cabell, Mercer, and Wood; NORTH CAROLINA—Buncombe, Chatham, Clay, Cleveland, Henderson, Orange, Polk, Swain, and Union; SOUTH CAROLINA—Abbeville, Anderson, Cherokee, Oconee, and Pickens; GEORGIA—Dade, Gilmer, Pickens, Walker, and Whitfield; ALABAMA—

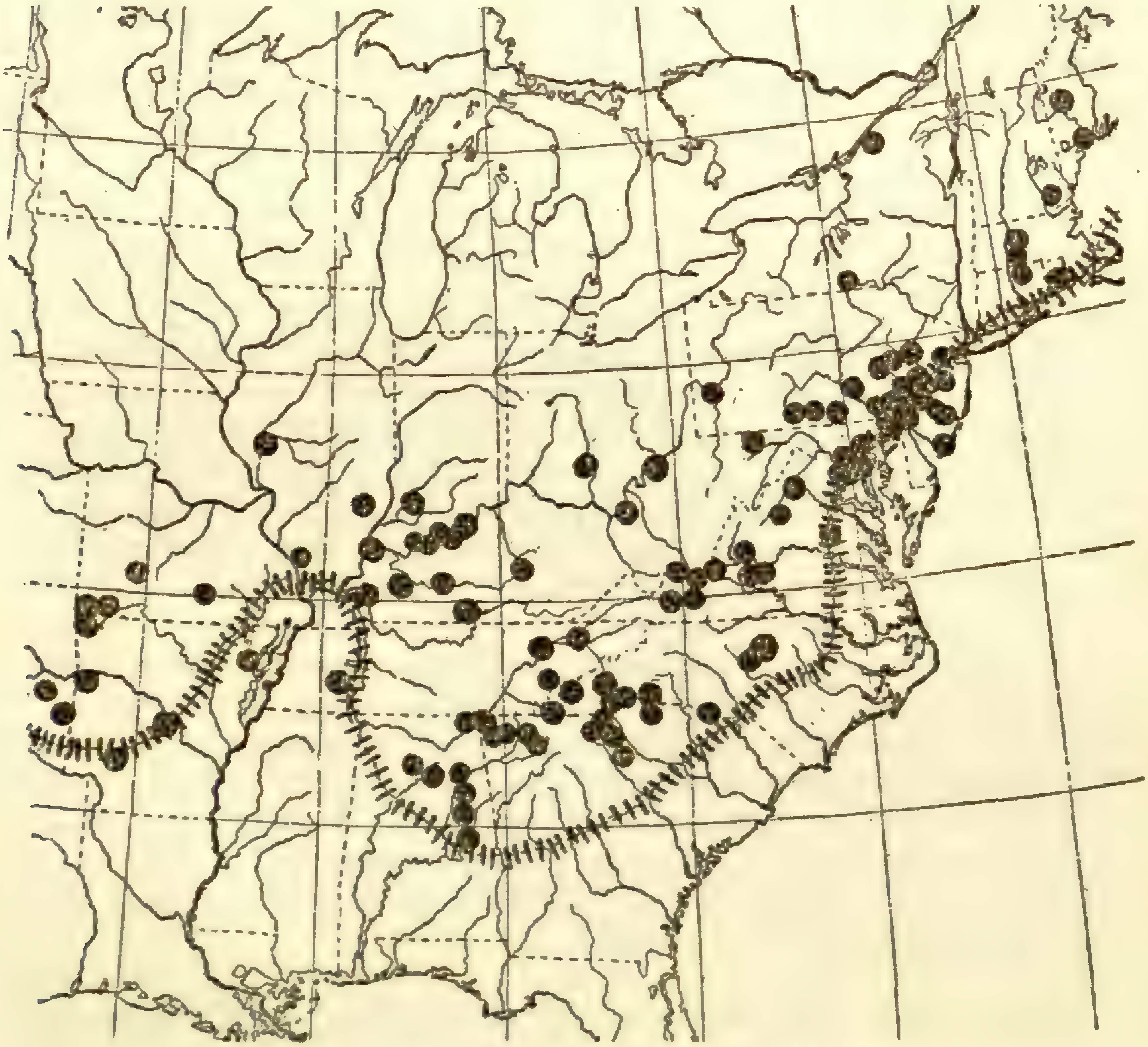

Fig. 3. Distribution of *Polygala ambigua.*

Blount, Calhoun, Clay, Cullman, Etowah, Jackson, and Tallapoosa; TENNESSEE—Blount, Chester, Grainger, and Knox; KENTUCKY—Edmonson, Lincoln, Lyon, Monroe, and Muhlenberg; OHIO—Ross; INDIANA—Clark, Crawford, Floyd, Greene, Harrison, Perry, Posey, and Spencer; ILLINOIS—Cass, Jackson, and Richland; MISSOURI—Barry, Greene, McDonald, Shannon, and Stoddard; ARKANSAS—Benton, Craighead, Nevada, Pulaski, and Sebastian; OKLAHOMA—Latimer and Leflore.

The Eastern Long-styled Phloxes, part 1[1]

EDGAR T. WHERRY

Continuing the discussion of the eastern species of *Phlox,* the section now to be taken up differs from the one next preceding in that the sepals are usually united to half their length or more, and the stamens and styles are nearly or quite as long as the corolla-tube. Peter[2] termed this section the *Reptantes,* but as the species name *reptans* has been superseded, another section name seems preferable, and *Ovatae* is here proposed. In the order believed to represent evolutionary progress in the group—that of gradual loss of prostrate stems, decrease in persistence of leaves and increase in complexity of inflorescence,—the species are:

PHLOX, SECTION OVATAE: KEY TO SPECIES

- Prostrate stems well developed, rooting and bearing flowering shoots at nodes; lower leaves spatulate, evergreen .... 8. *P. stolonifera*
- Prostrate stems poorly developed or lacking, exceptionally rooting at nodes; lower leaves never typically spatulate.
  - Flowering shoots mostly arising from clusters of leaves terminating decumbent stems; nodes few; calyx averaging 10 mm. long.
    - Lower leaves ensiform, evergreen; upper lanceolate; inflorescence conspicuously glandular .... 9. *P. buckleyi*
    - Lower leaves elliptic, marcescent; upper elliptic to ovate; inflorescence minutely pubescent .... 10. *P. ovata*
  - Flowering shoots mostly arising from leafless rootstocks; nodes numerous; calyx averaging less than 10 mm. long.
    - Rootstock short, sending up green or diffusely red-mottled stems; cymes grouped in a corymb or broad corymbose panicle with more or less elongate branches.
      - Upper leaves lanceolate to ovate; calyx 6–11 mm. long; range centering in the mountains, locally extending into lowland provinces .... 11. *P. carolina*
      - Upper leaves linear to lanceolate; calyx 6–8 mm. long; range centering in the lowlands, locally extending to moderate elevations .... 12. *P. glaberrima*
    - Rootstock elongated, curving upward into a strongly red-mottled or exceptionally green stem; cymes in a narrow conical or cylindrical panicle .... 13. *P. maculata*

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[1] Contribution from the Botanical Laboratory of the University of Pennsylvania. Previous articles in the series have appeared in Bartonia 11: 5. 1929 and 12: 24. 1931.

[2] In Engler & Prantl's Pflanzenfamilien 4^{3a}: 46. 1891.

The first two species listed in the synopsis on the opposite page are readily distinguishable, but the others exhibit more or less intergradation. As the treatment of these adopted here differs in some respects from that followed in current manuals and floras, a brief discussion of the method used in deciding what species should be recognized may well be presented.

Each of the commonly accepted species was studied in the field at ten or more localities. Within any one colony of *Phlox ovata* the individual plants proved to be constant in having a small number of nodes on the stem below the inflorescence and a relatively long calyx. Marked variation was shown, on the other hand, in leaf-shape, many plants having much narrower leaves than the species name would imply. All specimens with numerous nodes and short calyx were accordingly withdrawn from the *Phlox ovata* covers in the herbaria being consulted.

In *P. glaberrima* constancy was found in the essentially lanceolate leaf outline, and short calyx, so material with more elliptic leaves and longer calyx was similarly withdrawn. Again the species name turned out to be rather inappropriate, for the majority of the plants showed at least a small amount of pubescence.

Colonies of *P. maculata* showed a strikingly constant tendency to cylindrical or at most narrowly conical inflorescence, and from its covers were accordingly taken plants exhibiting a broader cone or a corymb of flowers. Here the character to which the species name refers could not be safely used in diagnosis, since several other Phloxes have the stem more or less maculate.

When the aberrant specimens from these sources were brought together, they proved to resemble one another in many respects, and individuals could readily be found among them which corresponded closely to the type specimen of Linné's *P. carolina*. As the withdrawal of this from the accepted list of species had been due to Gray, who had no adequate field acquaintance with the plants, its reinstatement seemed fully justified.

8. **Phlox stolonifera** Sims. CREEPING PHLOX. Plate 4.

History.—So far as recorded this *Phlox* was first observed, in Georgia, by the horticultural collector John Fraser in 1786, and living material sent by him to England in 1801 formed the basis of the specific description by Sims.[1] It was also found about the same time by Michaux[2] and named *P. reptans;* this has been widely used, but since Sims's name has a year's priority, Michaux's must be relegated to synonymy. Subsequent names for the same species were *P. obovata* Muhlenberg ex Willdenow,[3] *P. prostrata* Aiton,[4] and *P. crassifolia* Loddiges.[5] The last, as well as the combination *P. stolonifera crassifolia* Don,[6] represented the purple color-form, which is the more frequent and wide-spread; the original collection by Fraser, however, was of a form with violet corolla which occurs locally in the Blue Ridge, and the name *P. stolonifera* forma *violacea* has recently been applied to this by Peattie.[7]

As pointed out under *P. amoena* in the preceding article in this series,[8] a showy-flowered *Phlox* which has long been in cultivation combines the characters of *P. subulata* and *P. stolonifera* in such a striking way as to clearly indicate its origin as a hybrid between these species. This has been named successively *P. procumbens* Lehmann,[9] *P. subulata* β *latifolia* Bentham,[10] "P. verna" Hort. ex Vilmorin[11] and "P. amoena" Hort., not Sims; and these names, either alone or in various combinations, are sometimes mistakenly applied to *P. stolonifera* itself. As an example of the latter procedure, there may be cited the naming of what appears to be a color-form of the species "P. procumbens coerulea" Hort. ex Crockett.[12]

[1] Curtis's Botanical Magazine 16: pl. 563. 1802.
[2] Flora Boreali-Americana 1: 145. 1803.
[3] Enum. Pl. Hort. Reg. Berol. 201. 1809.
[4] Hortus Kewensis, ed. 2. 1: 326. 1810.
[5] Botanical Cabinet 16: pl. 1596. 1829.
[6] In Sweet's British Flower Garden, ser. 2. 3: pl. 293. 1835.
[7] Journ. Elisha Mitchell Sci. Soc. 45: 266. 1930.
[8] Bartonia 12: 53. 1931.
[9] Index Sem. Hamburg 1828: 17; Linnaea 5: 383. 1830.
[10] In DeCandolle's Prodromus 9: 306. 1845.
[11] Fleurs Pleine Terre, ed. 2. 682. 1866.
[12] Amer. Botanist 30: 159. 1924.

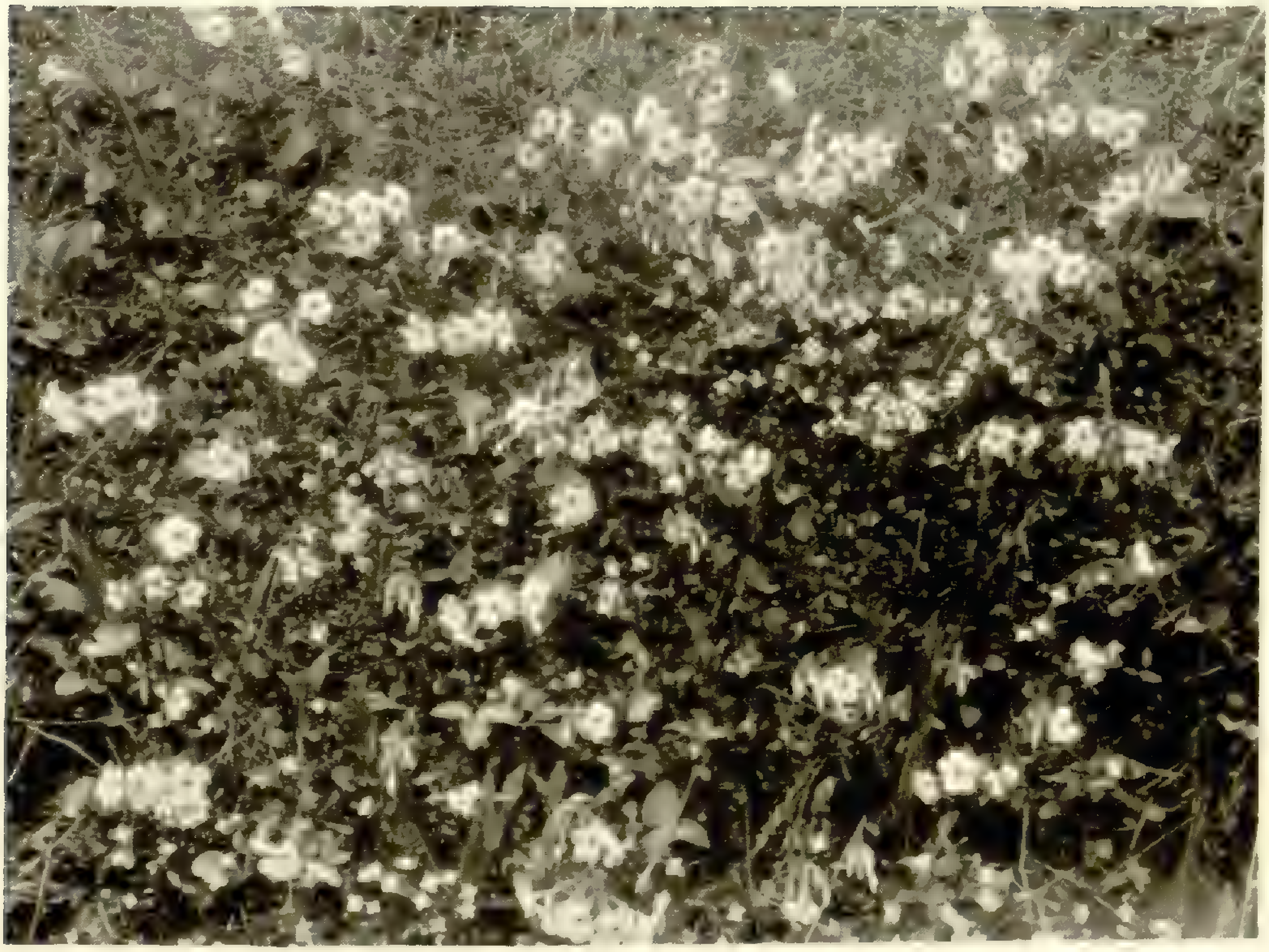

FIG. 1. *Phlox stolonifera.*
East of Mountain Lake, Garrett County, Maryland.

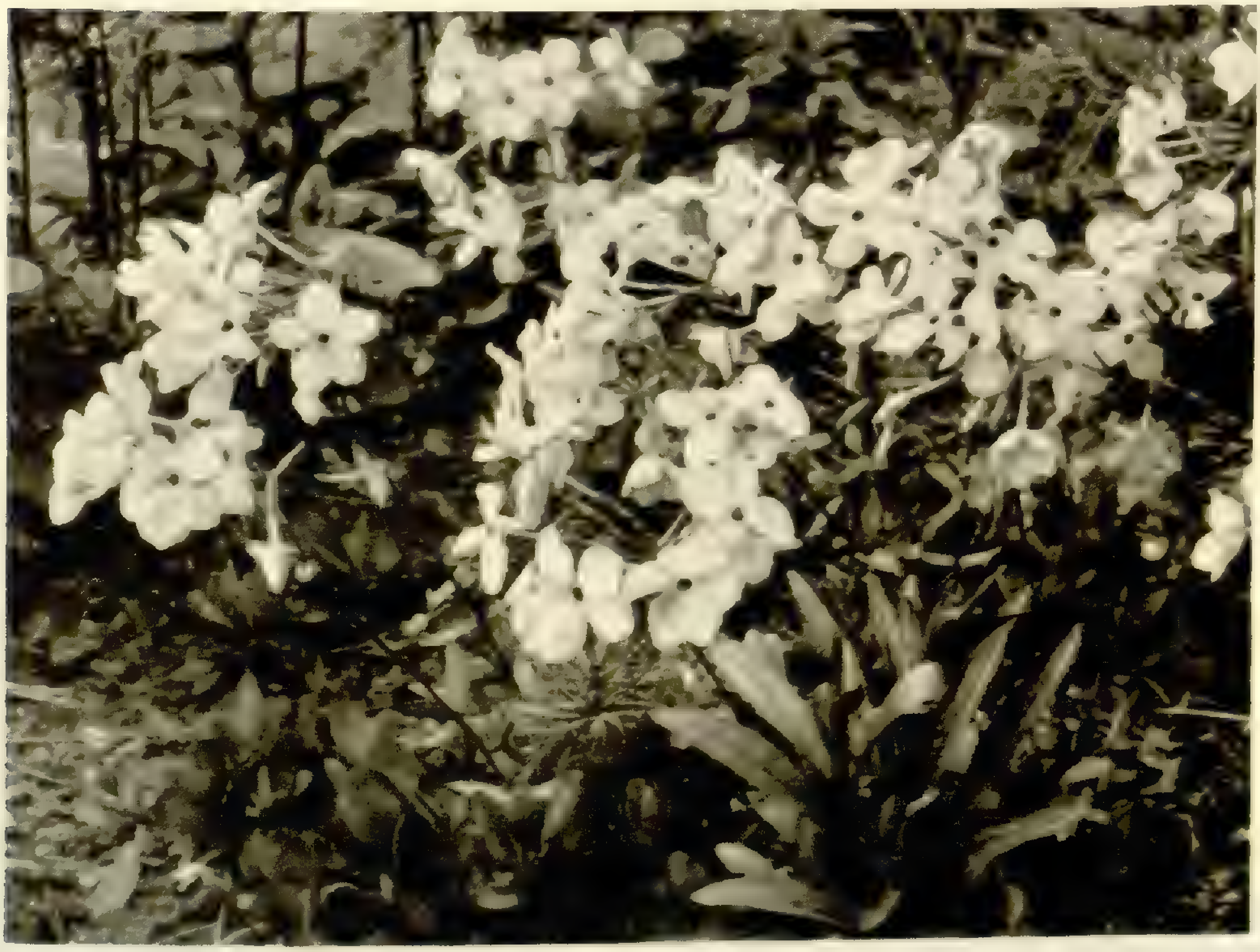

FIG. 2. *Phlox stolonifera.*
In cultivation; originally from North Carolina.

Geography.—*Phlox stolonifera* ranges from Georgia to Ohio and Pennsylvania, chiefly at high altitudes, though not on mountain summits. It no doubt survived glaciation in some portion of this area, but in its subsequent migration has not quite reached the Wisconsin terminal moraine, which is shown on the accompanying map by a dotted line. The mountain front, marked by a row of ʌ 's, has been a barrier to its eastern spread (except in the south), but westward it has descended from the mountains to the ravines of southern Ohio.

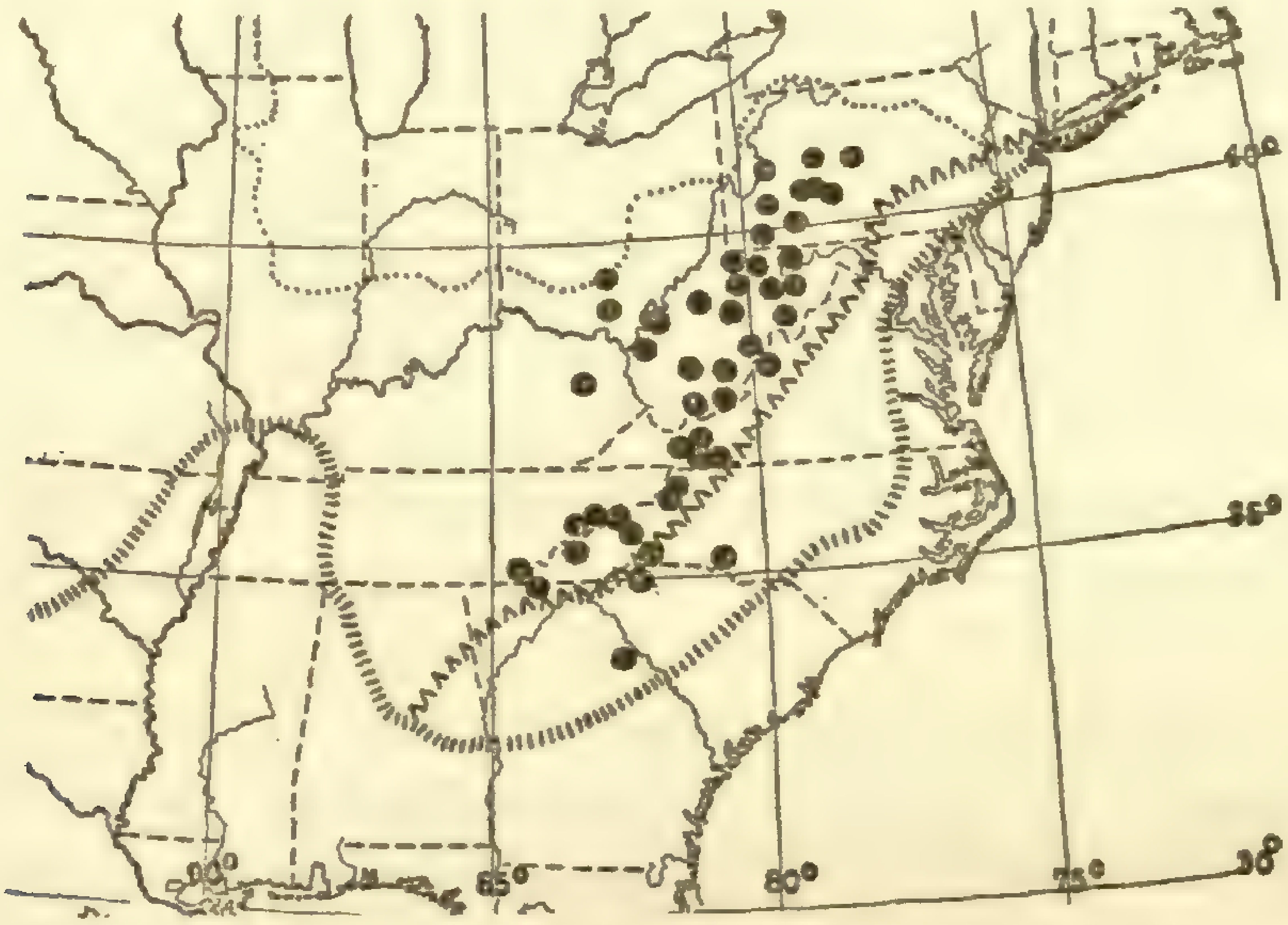

FIG. 1. Distribution of *Phlox stolonifera.*

[ALABAMA: Reported by Mohr[1] from Cullman County, but the specimens so labelled, preserved in the U. S. National Herbarium, represent *P. carolina.*]

[ARKANSAS: Nuttall[2] and Rafinesque, according to Brand,[3] listed this species as present in Arkansas, but in the lack of specimens collected by them or by subsequent botanists, a misidentification is believed to have occurred.]

[FLORIDA: In the Short herbarium, now at the Academy of Natural Sciences of Philadelphia, there is a specimen which undeniably represents this species labelled: "Phlox—near reptans. Cliffs of Aspalaga. (an P. divaricata ? S.) Florida. Dr. A. W. Chapman." As, however, Chapman[4] did not include Florida within the range of the species, and it has not been collected there by any one else, the specimen may really have come from the cliffs of some mountain stream, and the locality names have got confused in making out the label to send to Short.]

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[1] Plant Life of Ala. 686. 1901 (as *P. reptans*).

[2] Trans. Amer. Phil. Soc. 5: 196. 1837.

[3] In Engler's Pflanzenreich IV. 250: 63. 1907.

[4] Flora Southern States 338. 1860.

GEORGIA: As noted under History, this plant was first discovered by Fraser in Georgia, although the exact locality is not recorded. It must be rare there, as herbaria contain specimens from but two counties, Fannin and Wilkes.

[ILLINOIS: Brand[1] included this state in the range of *P. stolonifera,* and even added an exclamation point (!) to indicate certainty, but in the absence of specimens the report is not here credited.]

KENTUCKY: Limited to the eastern end, specimens being preserved from Licking River, Morgan County.

MARYLAND: Not listed in the report on the plant life of the state, but frequent in Garrett′ County.

[MISSISSIPPI: Included by Lowe,[2] but specimens so labelled, seen in the State University Herbarium, proved to be *P. divaricata* with the stolons particularly well developed.]

[MISSOURI: Another unsubstantiated report by Brand.]

NORTH CAROLINA: Fairly common in mountain woods, there being 7 county records: Avery,′ Buncombe, Madison, Mecklenburg, Polk,′ Swain,′ and Watauga.

OHIO: Occasional in the cool ravines of the southern part of the state, notably in Hocking and Jackson′ counties.

PENNSYLVANIA: Locally abundant in the Appalachians, in the counties: Armstrong, Blair, Cambria, Center′ (northeastern limit for the species), Clearfield, Fayette, Huntingdon, Somerset, and Westmoreland.

SOUTH CAROLINA: Rare, and reported only from Greenville County, by Peattie.[3]

TENNESSEE: Known to have been collected in 3 counties toward the eastern end: Cocke, Polk, and Sevier.

[VERMONT: Escaped in Lamoille and Rutland counties.]

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[1] In Engler's Pflanzenreich IV. 250: 63. 1907.

[2] Plants of Mississippi 233. 1921 (as *P. reptans*).

[3] Journ. Elisha Mitchell Sci. Soc. 45: 266. 1930.

VIRGINIA: Present in five Appalachian counties, Bath,′ Carroll, Grayson, Smyth, and Wythe.

WEST VIRGINIA: Apparently reaches maximum development here, the county list being: Cabell, Fayette, Gilmer, Grant,′ Greenbrier,′ Mason, Mercer, Monongalia, Monroe, Pendleton,′ Pocahontas,′ Preston, Taylor, Tucker, and Upshur.

Ecology.—Phlox stolonifera is typically an occupant of rich woods in non-calcareous regions, where its stems creep through the subacid leaf-litter. It also occasionally pushes out onto alluvial flats along streams, or rarely occupies rock ledges. On the whole, however, it is to be classed as a mesophytic forest herb. Its flowering season is vernal, beginning in late April, before the leaves of the deciduous trees are fully developed, and extending through May into early June. The long style brings the stigmas into the midst of the anthers, but protandry prevents self-pollination, and the long-tubed bright purple flowers attract butterflies which transfer pollen from one clump to another. The development of ability to propagate vegetatively has apparently been accompanied by lessened tendency to reproduce through seeds, and few of its ovules seem to mature.

Variation.—The variations shown by this species are less marked than in most Phloxes, and it does not grade toward other members of the section. Individual clumps differ in vigor, and correspondingly in size of leaves and floral parts, but the range is only moderate. As already stated under History, there are two distinct types of corolla-color, phlox-purple (Ridgway 65 b), which is the more wide-spread, and light violet (59 b), which appears locally in southern North Carolina and adjacent portions of other states. Few pallid phases of either of these have been noted, and albinos are practically unknown. As in previous papers of this series, color-forms will not be given technical names.

Cultivation.—The early references to this species noted under History concerned cultivated material, but most gardens are not sufficiently shady or rich in acid humus to suit it, and it is rarely grown. The beauty of its flowers should lead, however, to its more extensive use.

9. **Phlox buckleyi** Wherry. Sword-leaf Phlox. Plate 5.

History.—This highly distinct species was collected by S. B. Buckley at White Sulphur Springs, West Virginia, in June, 1838, but lay unnoticed in his herbarium for 80 years. It was rediscovered at the same place by Miss Marian S. Franklin of Lewisburg about 1919, and several new stations were located in 1929, encouraging its description and naming.[1]

Geography.—At the time the species was described six localities were known, equally divided between Virginia and West Virginia. An additional one has since been found, but the plant remains the most restricted endemic of all our eastern Phloxes, as brought out in the map herewith.

Virginia: Now known in two counties, Alleghany′ and Bath.′

West Virginia: Found thus far only in Greenbrier′ Co.

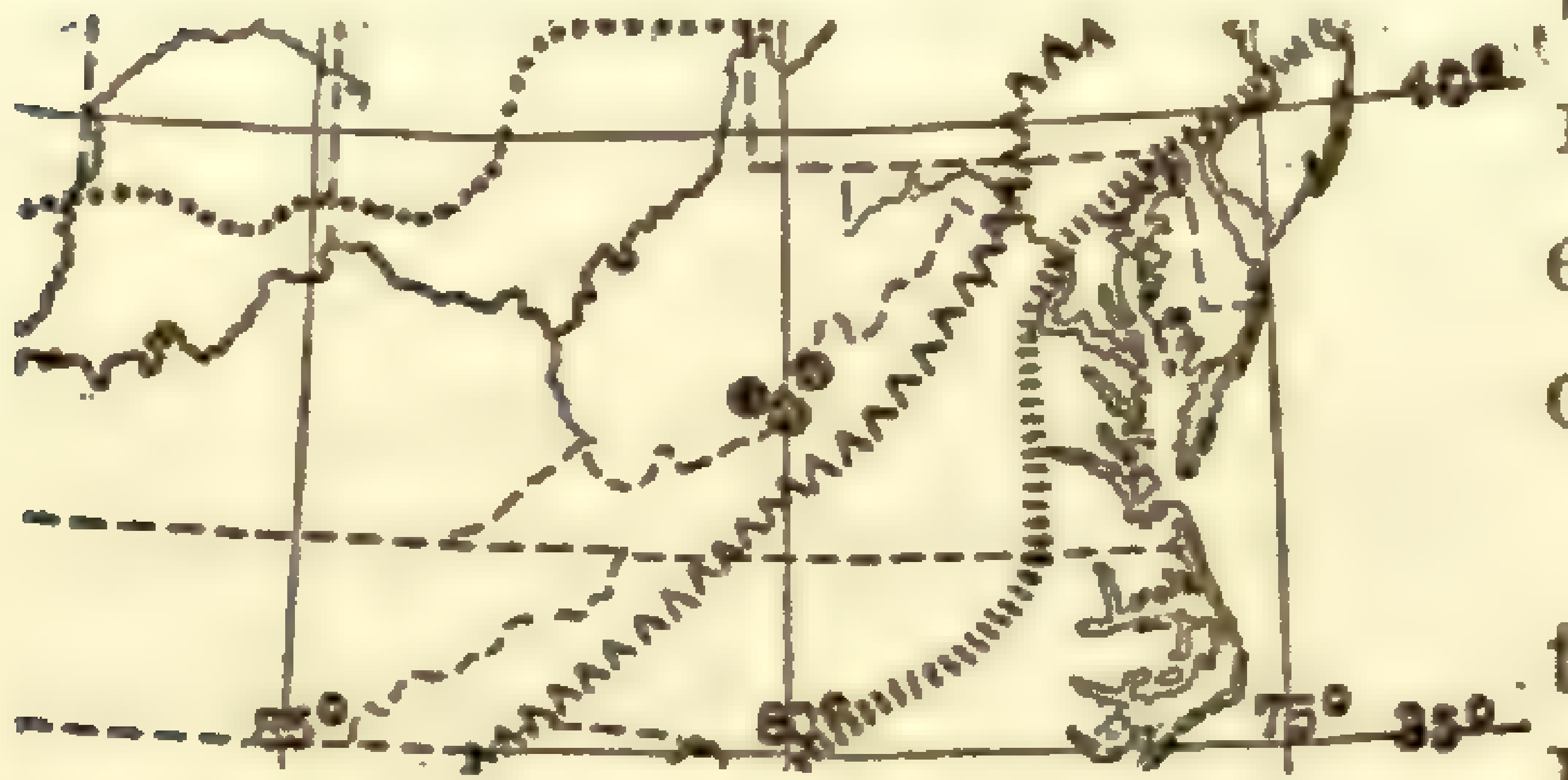

Fig. 2. Distribution of *Phlox buckleyi.*

Ecology.—The chief reason for the geographic restriction of this species is seemingly its requirement for a special type of habitat, for in all seven known localities it grows in a gravelly soil derived from a particularly slabby Devonian shale. It is, however, not a pioneer on shale-slopes, being unable to come in until after a thin woodland cover has developed and the soil has become rich in subacid humus. The denser shade of climax forests is also unfavorable to it, and it dies out as they mature. Its thick narrow persistent leaves lead to its classification as moderately xerophytic. The blooming period extends from mid-May to mid-June, the bright phlox-purple flowers attracting insects as do those of the preceding species.

Variation.—Only minor variations, of nutritional origin, have been observed.

Cultivation.—The difficulty of matching the native habitat conditions of this plant is likely to prevent its ever being much cultivated.

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[1] Journ. Wash. Acad. Sci. 20: 25. 1930.

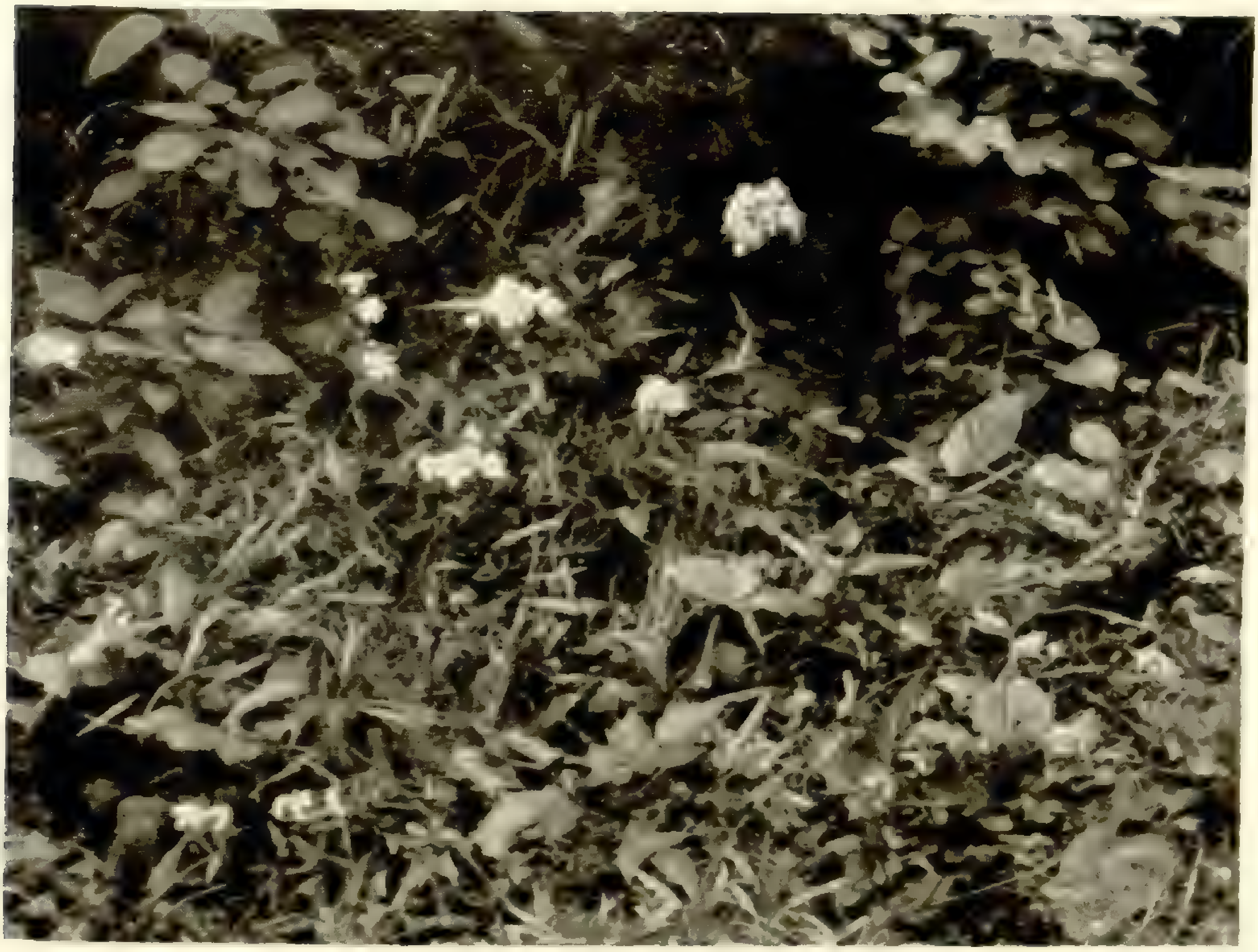

FIG. 1. *Phlox buckleyi.*
Southeast of Alleghany Station, Alleghany County, Virginia.

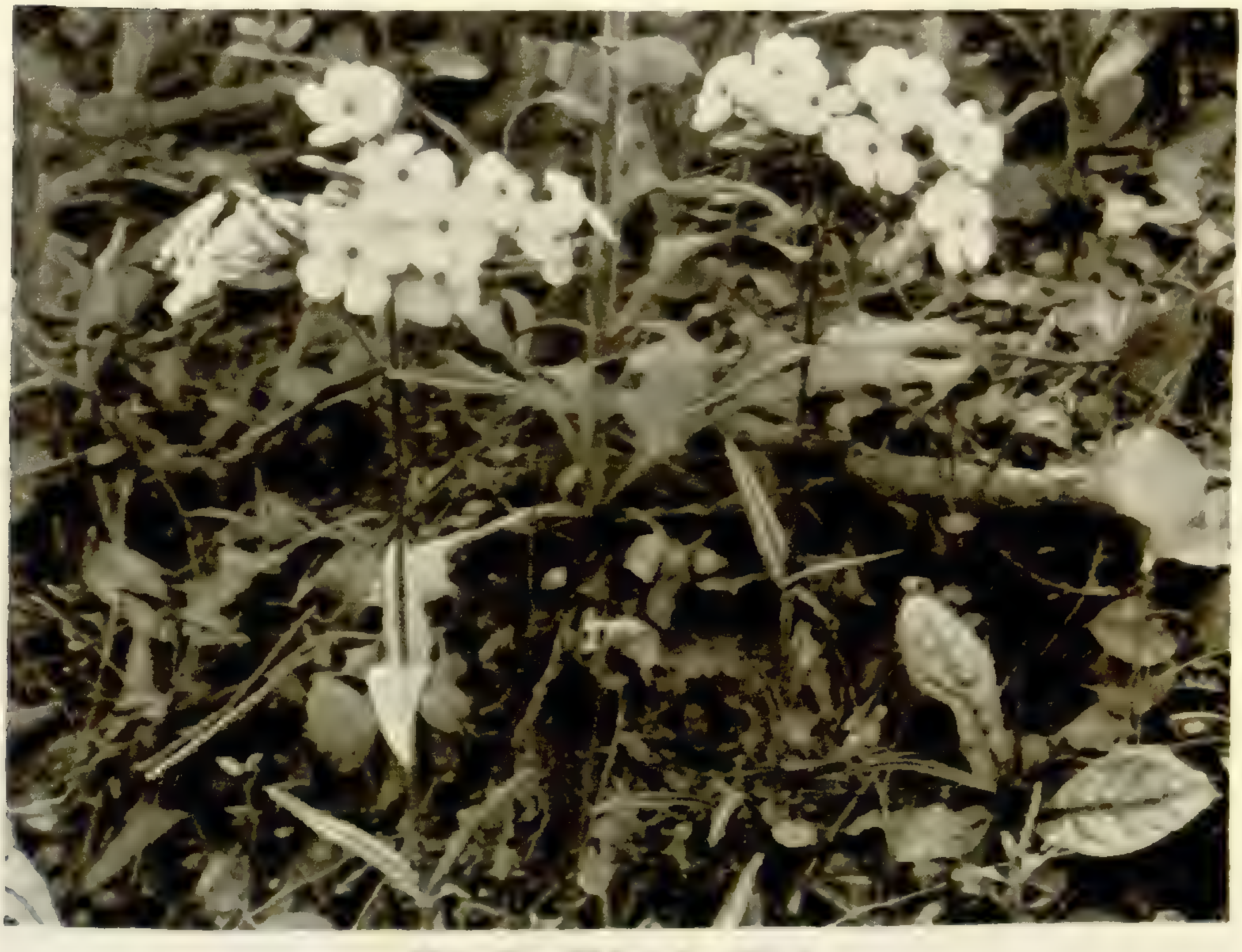

FIG. 2. *Phlox buckleyi.*
Southeast of Caldwell, Greenbrier County, West Virginia.

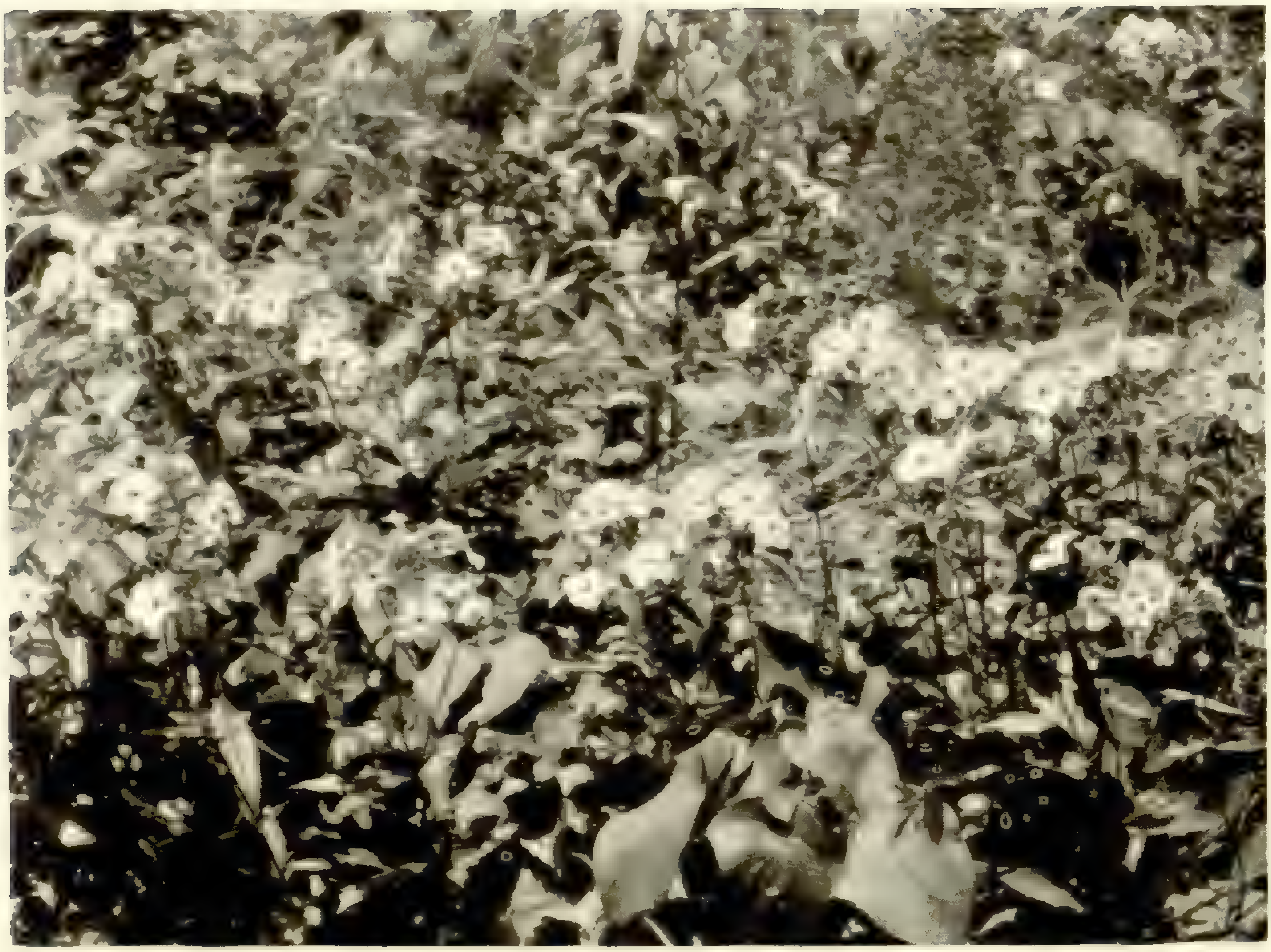

FIG. 1. *Phlox ovata.*
West of White Sulphur Springs, Greenbrier County, West Virginia.

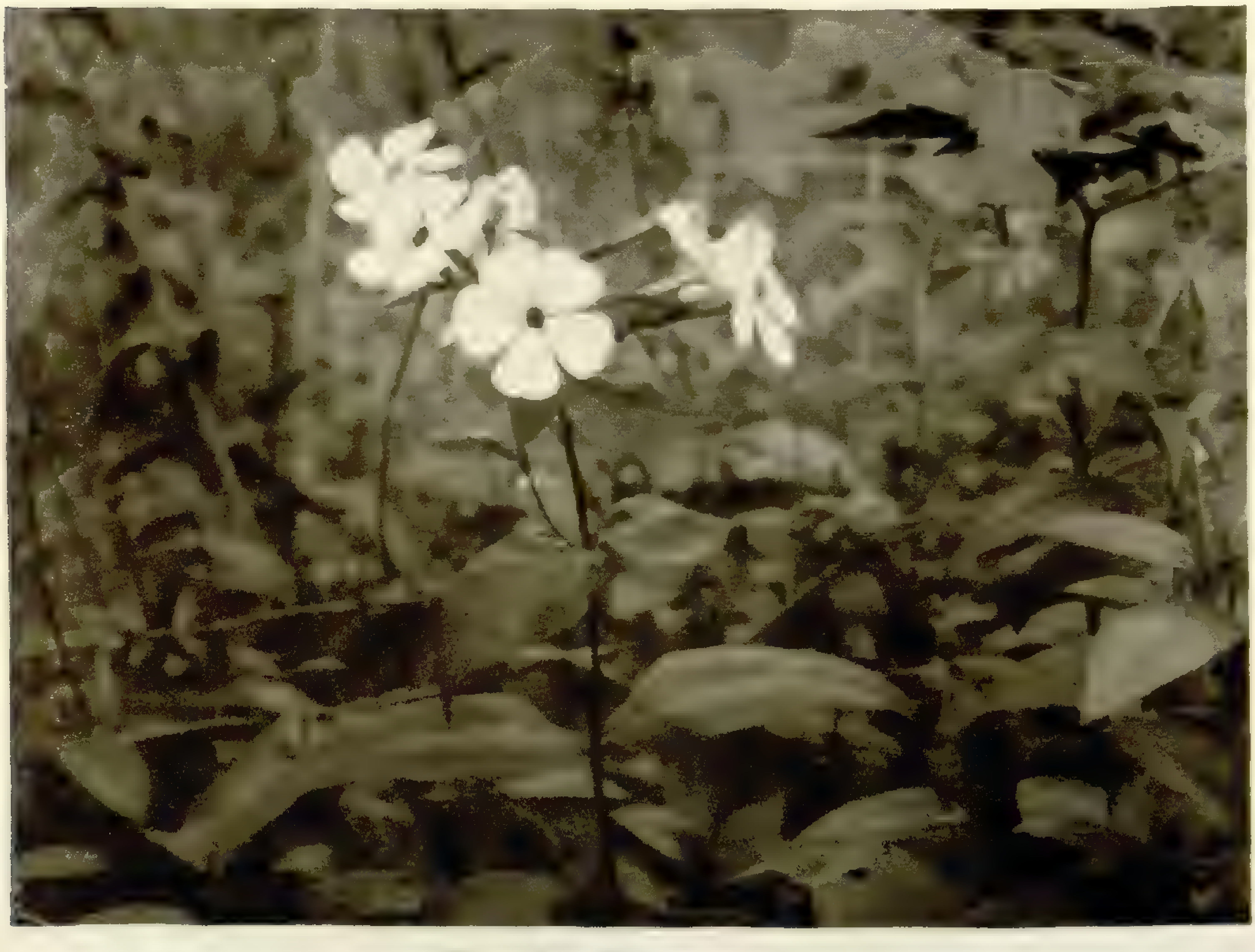

FIG. 2. *Phlox ovata.*
In cultivation; originally from Virginia.

10. **Phlox ovata** Linné. MOUNTAIN PHLOX. Plate 6.

History.—In Plukenet's[1] Mantissa of 1700 there was included a plant characterized as "Lychnidea fistulosa *Marilandica,* Clinopodii *vulgaris* folio, flore amplo singulari." The figure shows this as a *Phlox* with remote, ovate, petioled leaves and a single flower subtended by a large bract. Linné[2] named it *Phlox ovata,* basing his diagnosis on the Plukenet figure, although Jackson[3] records that the specimen in his herbarium (which has several flowers in a corymb) was already there in 1753.

Sir Joseph Banks, according to Sims,[4] recognized that Plukenet's figure and Linné's diagnosis referred to an abnormal individual, and extended the name *P. ovata* to cover plants with corymbose flowers. Michaux,[5] on the other hand, proposed *P. latifolia* for the many-flowered plants he collected in North Carolina. Pursh[6] listed both *ovata* and *latifolia,* not realizing that they are identical.

In the second edition of his Species Plantarum, Linné[7] described another *Phlox* with broad leaves as *P. carolina.* Bentham[8] considered this to be conspecific with *P. ovata,* but separated three varieties, applying to one of them the combination *P. carolina* α *ovata.* In 1870 Gray[9] pointed out objections to this procedure, proposing instead *P. ovata elatior;* and later[10] discarded the name *carolina* entirely, as a synonym of *P. ovata.* In this he has been followed by most botanists, but a study of photographs[11] of the Linnean specimens of the two shows that they actually represent distinct species, and *P. carolina* will be discussed at length on a subsequent page.

[1] Mantissa 122, pl. 348, fig. 122-pl. 4. 1700.
[2] Species Plantarum (1): 152. 1753.
[3] Suppl. Proc. Linn. Soc. 124: 116. 1912.
[4] Curtis's Botanical Magazine 15: pl. 528. 1801.
[5] Flora Boreali-Americana 1: 143. 1803.
[6] Flora Americae Septentrionalis 1: 148 & 150. 1814.
[7] Species Plantarum, ed. 2. 1: 216. 1762.
[8] In De Candolle's Prodromus 9: 304. 1845.
[9] Proc. Amer. Acad. Arts Sci. 8: 249. 1870.
[10] Synoptical Flora N. A. 2, pt. 1: 130. 1878.
[11] Kindly obtained for me by Dr. Wm. R. Maxon.

Geography.—Like *Phlox stolonifera, P. ovata* is essentially a southern Appalachian plant, but the ranges of the two differ in details, as comparison of their distribution maps will show. The most remarkable feature of the present species consists in its occurrence in an outlying area largely within the glaciated territory of Indiana and Ohio. The route by which migration to this area took place is uncertain, but it probably traversed eastern Kentucky.

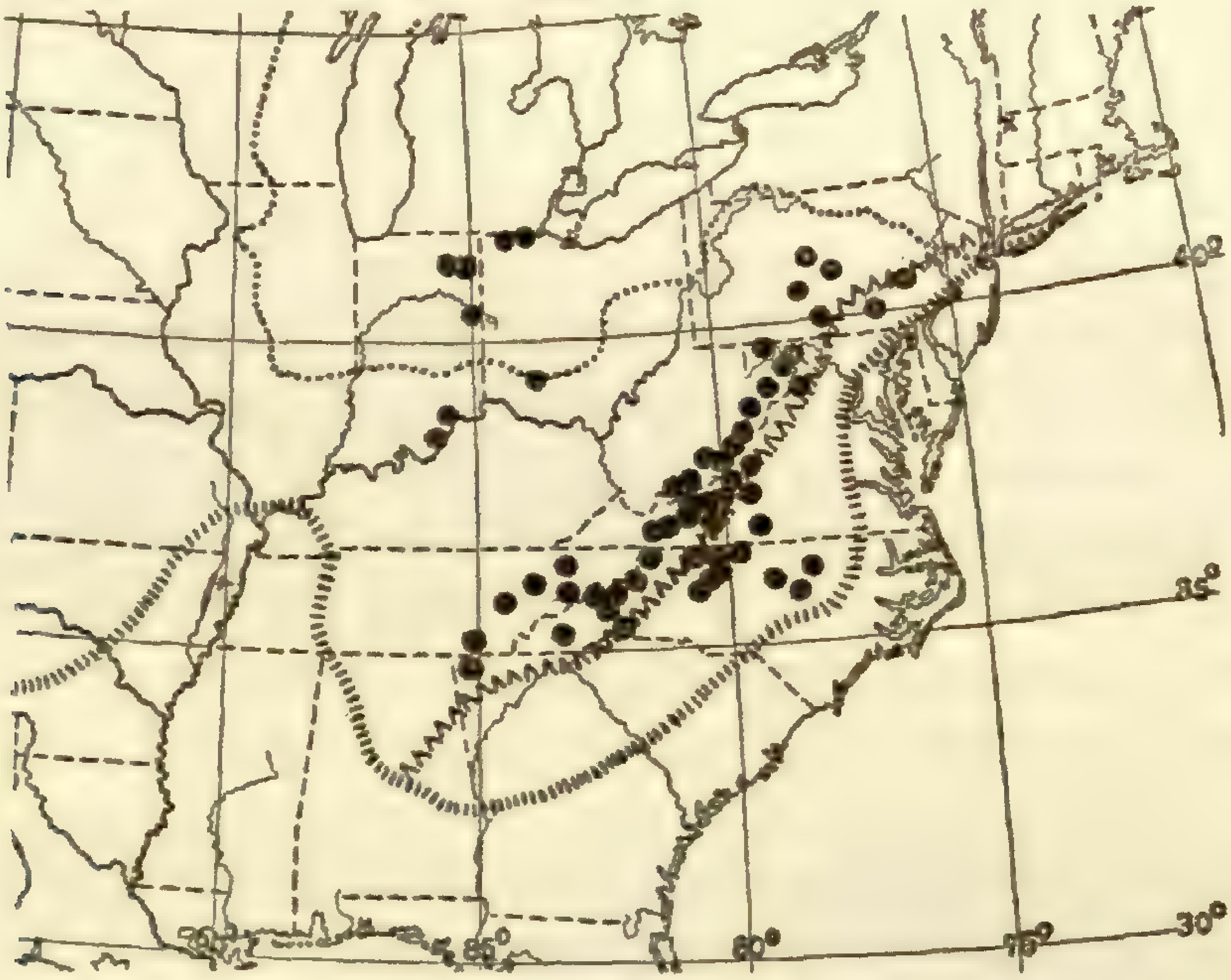

Fig. 3. Distribution of *Phlox ovata.*

[Alabama: The record for Monroe County published by Mohr[1] is shown by his material in the National Herbarium to have been based on occurrences of *P. carolina.*]

[Florida: Brand[2] included this state in the range of *P. ovata,* citing a specimen "Rafinesque n. 12." As there is no other report from anywhere near its boundaries, however, an error in identification or labelling is believed to have occurred.]

Georgia: Exceptional this far south, specimens having been seen only from Dade County, at the northwest corner of the state.

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[1] Plant Life of Alabama 685. 1901.

[2] In Engler's Pflanzenreich IV. 250: 63. 1907.

Indiana: Found locally toward the east side, in Allen, Clark, Jay, Jefferson, and Whitley counties.

[Kentucky: Although no specimens have been seen, this species no doubt occurs in the eastern uplands, over which it presumably migrated in reaching the Ohio-Indiana area.]

Maryland: Recorded by Shreve[1] from Allegany County.

[Massachusetts: Escaped in Berkshire County.]

North Carolina: Abundant in the Blue Ridge province, and extending, as do many other mountain plants here, well out into the Piedmont. The county list is: Ashe,[f] Avery,[f] Buncombe,[f] Burke, Caldwell,[f] Forsyth,[f] Franklin,[f] Jackson, Madison,[f] Orange,[f] Polk, Rockingham,[f] Stokes,[f] Surry,[f] Wake,[f] and Yancey.[f]

Ohio: Specimens have been seen from Fulton, Highland, and Lucas counties, the last being the northernmost point the species is known to reach.

Pennsylvania: Occasional in the Appalachians and inner Piedmont, there being six county records: Berks, Center, Franklin, Huntingdon, Mifflin, and York. The first of these represents the eastern limit for the species.

[South Carolina: Probably present along the northwest side, although no specimens or dependable records have been seen.]

Tennessee: Scattered through the eastern uplands, and known from Cocke, Hamilton, Hawkins,[f] Knox, and Roane counties.

Virginia: Frequent in the Appalachians and southern Blue Ridge, herbaria containing specimens from 15 counties: Alleghany,[f] Bath,[f] Bedford, Botetourt, Floyd,[f] Giles, Highland,[f] Montgomery,[f] Pittsylvania, Pulaski,[f] Roanoke,[f] Rockbridge, Shenandoah, Smyth, and Wythe.

West Virginia: Overlooked by Millspaugh[2] in listing the plants of the state, but actually not uncommon toward the southeastern side, as the following county list shows: Greenbrier,[f] Hampshire,[f] Hardy, Mercer,[f] Monroe,[f] Morgan, and Pendleton.[f]

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[1] Plant Life of Maryland 473. 1910.

[2] Living Flora of West Virginia. 1913.

Ecology.—*Phlox ovata* grows chiefly in open woods or thickets, but occasionally enters alluvial meadows and rarely tracts underlain by calcareous rocks. Its soils may be either high or low in humus, but are almost always subacid in reaction. In successions it comes in fairly early, reaches its best development at an intermediate stage, and dies out as climax forest conditions are approached. It begins to bloom about the first of May, and continues through June or even early July at higher elevations. The relations of its flowers to insects are similar to those of the preceding members of the section.

Variation.—Unlike the two species just considered, the present one is markedly variable, especially in foliage characters, and unless herbarium specimens are fairly complete it is difficult to distinguish with certainty from the one which follows. The flowering shoots average 40 cm. in height, and are notably few-leaved, there being usually only three or four nodes below the inflorescence proper. Their lowest leaves have long petioles and linear blades, and higher ones exhibit progressive shortening of petioles and widening of blades, until the pair below the bracts may be cordate-clasping and orbicular-ovate. The degree of blade-enlargement varies markedly from one plant to another, however, and is sometimes so slight that even the uppermost leaves are still petioled with the blades scarcely wider than linear-elliptic. Stating the situation in another way, measurements of the largest leaf-blades (made on 50 plants) show them to range in length from 50 to 100 mm. and in width from 10 to 30 mm. The first bracts are often smaller than the leaves, but may be larger. On sterile shoots, one or more of which are usually conspicuous around the crown of the plant, the leaf-blades show similar variation in width, but petioles are always well-developed. Under such circumstances it is manifestly impossible to draw up any simple description of the leaf-characters of this species, or to depend primarily upon the leaves for constructing a key to the section, as attempted in some manuals. The use of a combination of characters for diagnostic purposes seems unavoidable.

The calyx of *Phlox ovata* averages longer than that of any other eastern species, and this feature can often be used to recognize it when the specimens lack sterile shoots, although it must be borne in mind that occasional individuals normal in other respects may have an exceptionally short calyx. The usual range in sepal-length is from 8.5 to 12 mm., with 10 mm. most frequent. The sepals are often united to half, but sometimes only to 0.4, and again to 0.6 or even 0.8 their length. Although the calyx is normally glabrous, the pedicels vary from glabrous to densely short-pubescent with the hairs acute or at times minutely gland-tipped.

A large corolla is also rather characteristic, the tube averaging 20 mm. long (range 17 to 23 mm.), and the broadly to narrowly obovate lobes somewhat over half as long. Its color is almost always a brilliant phlox-purple, and pallid or albino forms are decidedly rare. The styles range in length from 12 to 20 mm., bringing the stigmas either into the midst of the anthers, or slightly exserted beyond them.

Cultivation.—A *Phlox* with showy flowers such as characterize this species could not fail to early attract the attention of horticulturalists, and according to Sims[1] it was introduced into English gardens before 1801. In subsequent years it has been occasionally offered by dealers, though not always under the same name. The confusion of the two species, *P. ovata* and *P. carolina,* already mentioned under History, has resulted in the same material being listed under both these names, or sometimes a combination of the two. Still others have also been applied to strains of this *Phlox,* such as *P. listoniana* Sweet[2] or *P. ovata* β *listoniana* Don,[3] but the characters are not sufficiently distinctive to justify this. In rich garden soils this species is not very long lived, but it is well suited for wild areas where the soil is sterile and acid, there yielding a brilliant display.

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[1] Curtis's Botanical Magazine 15: pl. 528. 1801.

[2] Hortus Brittanicus, ed. 2. 368. 1830.

[3] Gen. Hist. Dichl. Plants 4: 241. 1838.

11. **Phlox carolina** Linné. THICK-LEAF PHLOX. Plate 7.

History.—Of all our eastern species of *Phlox,* the present one has proved the most difficult to interpret. Few current manuals or floras so much as mention it, and those which do combine it with either the next-preceding or the next-following species. That it deserves independent recognition, however, seems evident from the data here assembled.

The first known account of this *Phlox* was that published, accompanied by a colored plate, by Martyn[1] in 1728; he termed it "Lychnidea Caroliniana, Floribus quasi umbellatim dispositis; foliis lucidis, crassis, acutis." Four years later it was figured by Dillenius[2] as "Lychnidea folio salicino." Linné overlooked these articles in preparing the first edition of his Species Plantarum, but evidently obtained a specimen shortly thereafter, for he included it in the second edition,[3] with a discussion of its differences from *P. glaberrima.*

During the following fifty years a number of other names were proposed for this same *Phlox.* In the eighth volume of his Vegetable System, dated 1773, Hill[4] included it as the "Rugged-stalked Brightweed, *P. caroliniana,*" this form of the name apparently representing a misprint for *carolina,* as it had been spelled by Linné. In 1794 *P. altissima* was suggested by Moench[5] as a substitute name. Nine years later Michaux[6] described a *P. triflora* from the uplands of Carolina, and a photograph[7] of his specimen shows that he had the same species. Plants collected by Fraser had meanwhile been successfully cultivated at Malmaison, and in 1804 Ventenat,[8] unaware of the existence of all these prior names, added still another, *P. suffruticosa;* and this has been extensively used in horticultural writings, both for the present species and for apparent hybrids between it and *P. maculata.*

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[1] Hist. Pl. Rar. 10, pl. 10. 1728; ed. 2. 4, pl. 9. 1752.
[2] Hortus Elthamensis 1: 205, pl. 166, f. 203. 1732.
[3] Species Plantarum, ed. 2. 1: 216. 1762.
[4] Vegetable System 8: 32, pl. 31, fig. 4. 1773.
[5] Methodus Plantas Hort. Marburg. 454. 1794.
[6] Flora Boreali-Americana 1: 143. 1803.
[7] Obtained through the kindness of Mr. Ivar Tidestrom.
[8] Jardin Malmaison 2: no. 107, note. 1804.

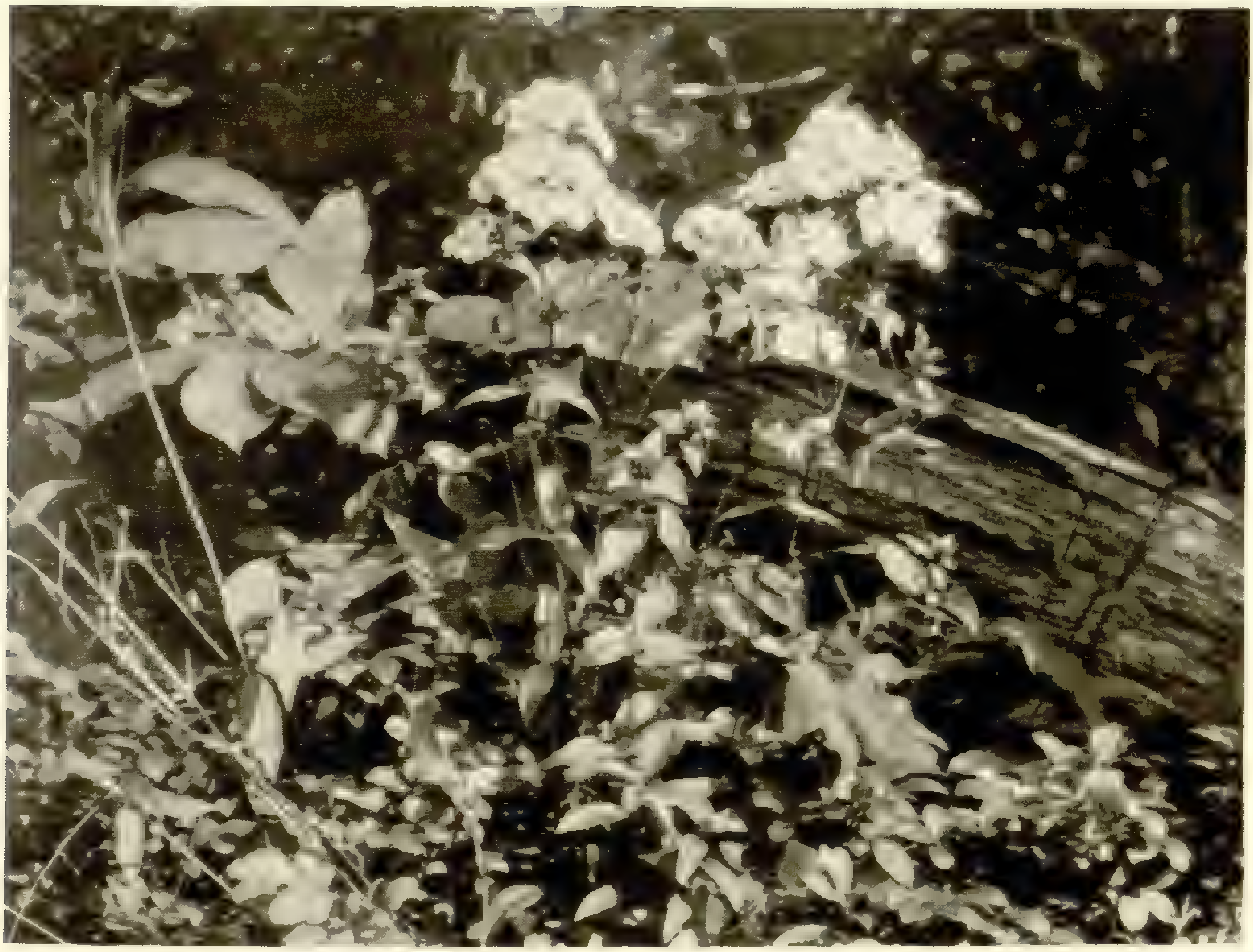

FIG. 1. *Phlox carolina triflora.*
South of Clinton, Anderson County, Tennessee.

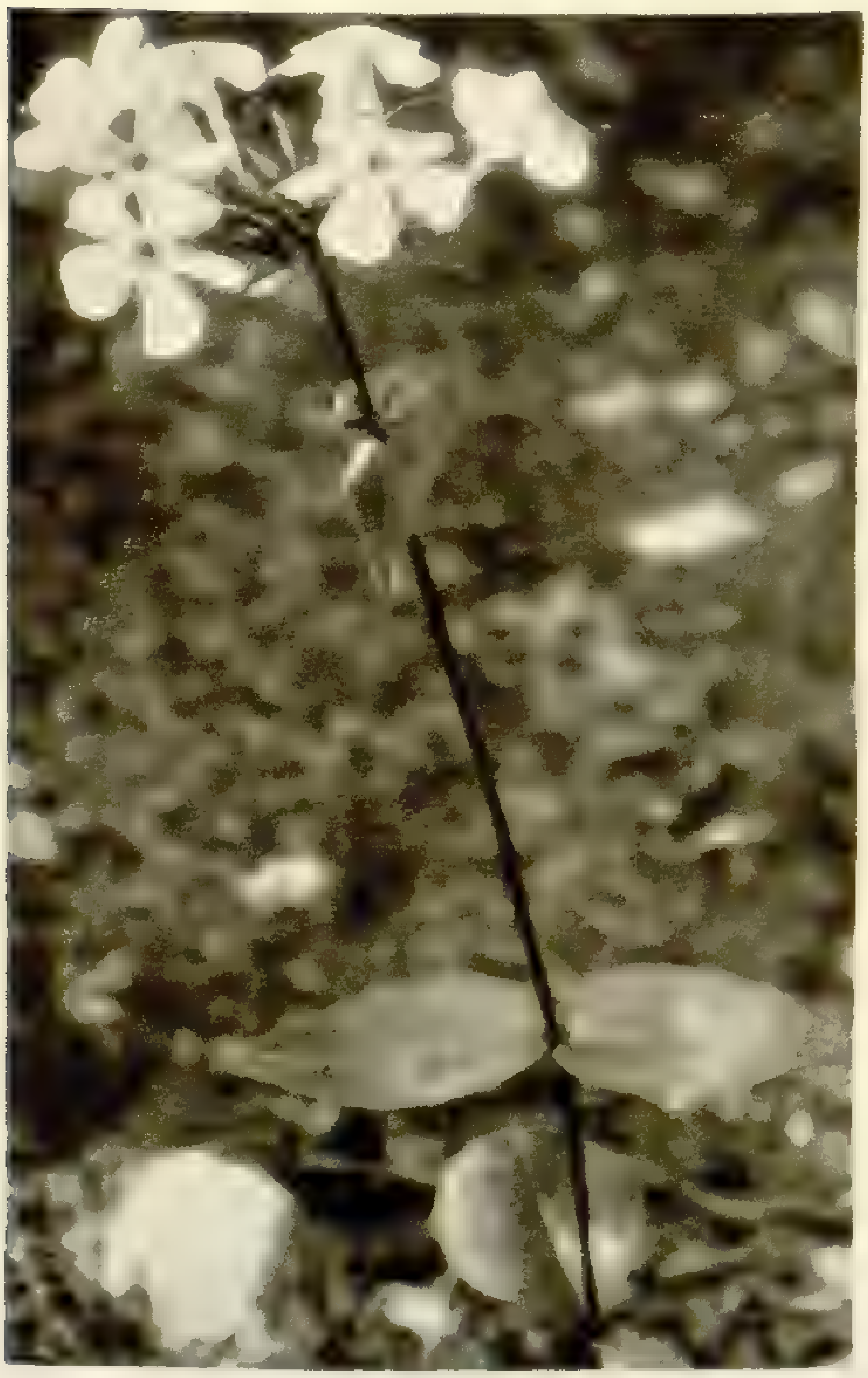

FIG. 2. *P. c. heterophylla.*
Cult.; from Alabama.

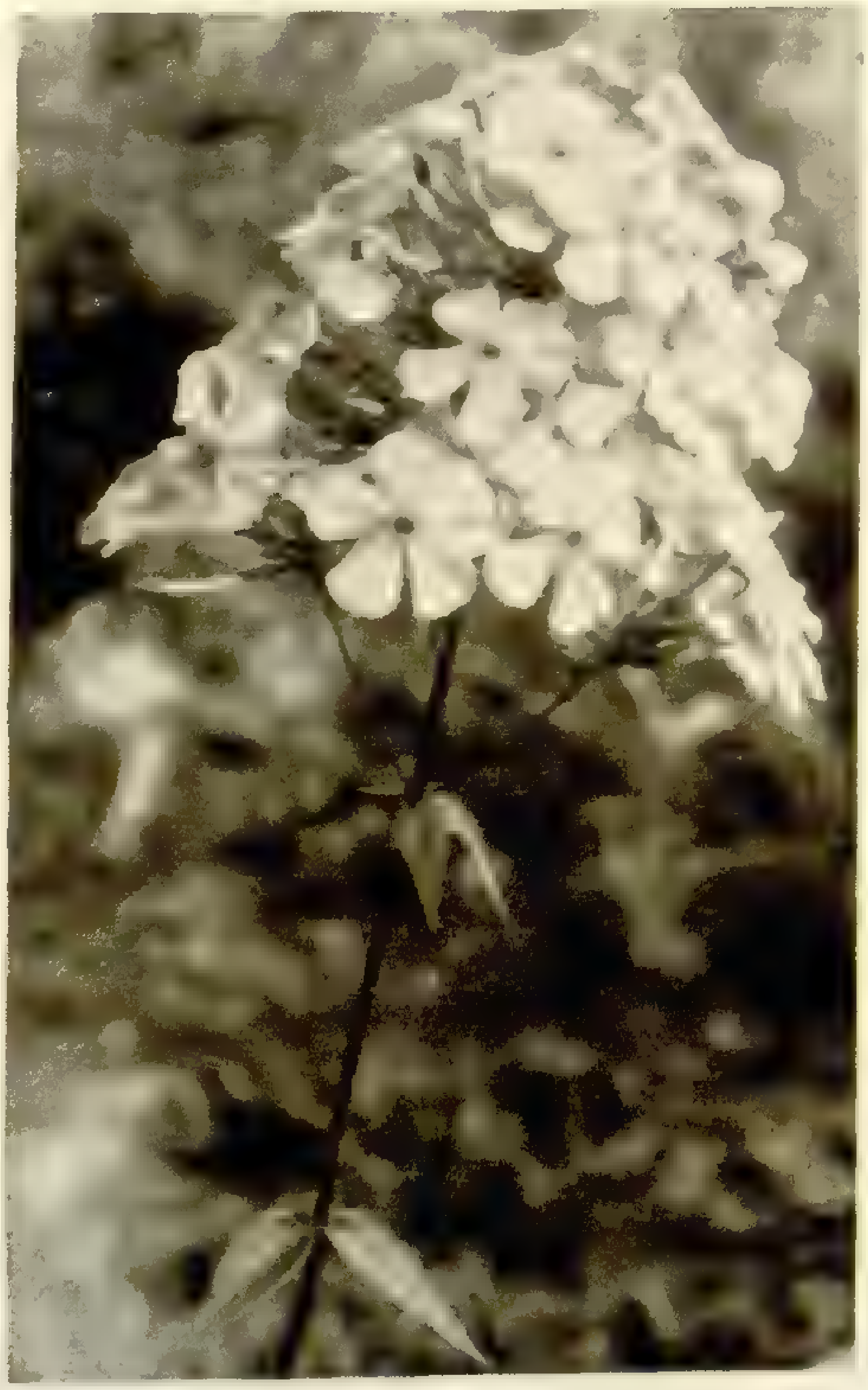

FIG. 3. *P. c. altissima.*
Cult.; from North Carolina.

In the first volume of his Flora, Pursh[1] included *P. carolina,* with *P. triflora* as a doubtful synonym; then in the supplement at the end of the second volume[1a] he added a *P. nitida,* noting that it "approaches near to *P. Carolina,*" but flowers later and longer. Elliott[2] followed Pursh in listing both names, remarking under *P. nitida* that "this has generally been considered in this country as the *P. Carolina.* . . . Linnaeus however may have united two species under his *P. carolina.*" *P. carnea* Sims,[3] supposedly related to *P. suaveolens,* and *P. revoluta* Aikin[4] also differ from *P. carolina* Linné in only minor particulars.

When Bentham[5] came to monograph the Phloxes, he recognized that several of the names above cited referred to the same species, but he considered partial separation possible, and accordingly listed under *P. carolina* three varieties; α *ovata,* β *nitida,* (including *P. suffruticosa* and approaching *P. glaberrima*), and γ *puberula* (replacing *P. triflora*). The first of these may be withdrawn from consideration here because it represented a distinct species, already discussed; how the other two should be treated can best be decided after the variability of *P. carolina* has been described.

Recognizing that the Linnean name *ovata* had priority over *carolina,* Gray[6] preferred the former as a species designation, and made the original *P. carolina* a variety, *P. ovata elatior.* Later,[7] however, he reduced it to complete synonymy with *P. ovata,* considering it distinguishable only as "a taller form, with narrower more tapering leaves and pointed calyx-teeth, approaching the next species [*P. glaberrima*]." At the same time he classed the Ventenat plant as *P. glaberrima* var. *suffruticosa,* with several of the names above listed as synonyms of it. One additional name, *P. heterophylla* Beauvais, was published by Brand.[8]

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[1] Flora Americae Sept. 1: 149. 1814; [1a] 2: 730. 1814.

[2] Sketch Botany S. C. and Ga. 1: 245 [1821].

[3] Curtis's Botanical Magazine 47: pl. 2155. 1820.

[4] Trans. Md. Acad. Sci. Let. 1: 90. 1837.

[5] In De Candolle's Prodromus 9: 304. 1845.

[6] Proc. Amer. Acad. Arts Sci. 8: 249. 1870.

[7] Syn. Flora N. A. 2, pt. 1: 130. 1878.

[8] In Engler's Pflanzenreich 4. 250: 65. 1907.

Geography.—Accepting *Phlox carolina* as comprising the plant so named by Linné and the various intermediates between *P. ovata, P. glaberrima,* and *P. maculata* to which so many other names have been given, its range is as follows: Chiefly in the Blue Ridge and Appalachians, from Georgia and Alabama to Maryland, with local extensions into the Piedmont, Central Lowland, and Coastal Plain.

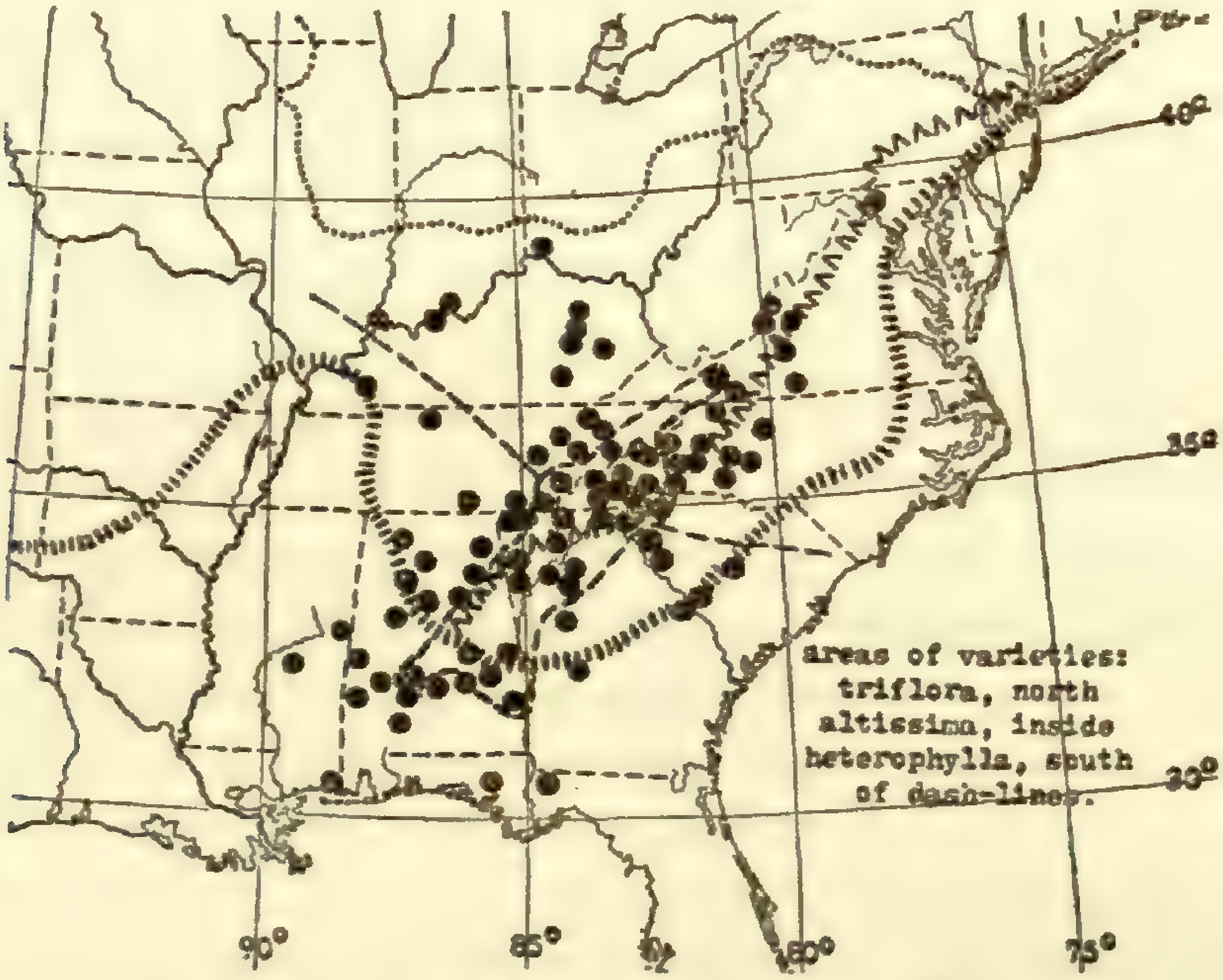

FIG. 4. Distribution of *Phlox carolina.*

ALABAMA: Wide-spread in this state, having been collected in 20 counties: Barbour, Choctaw, Cullman, Dallas, De Kalb, Elmore, Etowah′, Jefferson′, Lawrence, Lee, Lowndes′, Macon, Marengo, Monroe, Montgomery, St. Clair′, Sumter′, Tuscaloosa, Walker′, and Wilcox′. Both unusually large and unusually small-leaved forms occur.

FLORIDA: Specimens in herbaria from several places in Gadsden and Washington Counties appear to represent this species.

GEORGIA: Occasional in the Blue Ridge and Piedmont, in Catoosa, Cobb, Dade, De Kalb, Fannin, Floyd, Gwinnett, Haralson, Macon, Pickens, Rabun′, Richmond, and Spalding counties.

INDIANA: The northern variety enters this state, as shown by collections made in Crawford, Perry, and Posey counties by Mr. C. C. Deam.

Kentucky: Scattered through the eastern uplands, specimens having been seen from Bath, Breathitt, Estill, Lyon, Marshall, and Powell counties.

Maryland: In 1837 Aikin[1] recorded from this state a *Phlox revoluta,* his description of it corresponding closely to the variety of *P. carolina* which ranges farthest northeastward. He apparently obtained it in Frederick County, although it has not subsequently been collected there.

Mississippi: Material supposed to represent *P. glaberrima,* from Jackson, Noxubee, and Scott counties, shows such long sepals that it is here regarded as *P. carolina* instead.

North Carolina: The specific name of this *Phlox* is very appropriate, for at least two varieties are wide-spread and frequent in the Blue Ridge and Piedmont of this state, the county list being: Alleghany′, Buncombe, Burke, Caldwell, Forsyth, Haywood, Henderson′, Iredell, Jackson′, Lincoln, McDowell′, Macon′, Madison, Mitchell, Polk′, Rowan, Swain, and Transylvania′.

Ohio: In the Lea Herbarium, preserved at the Academy of Natural Sciences of Philadelphia, there is a specimen of the northern variety collected in 1839 in the vicinity of Cincinnati, Hamilton County. It has subsequently vanished there, but has recently been discovered in Adams County by Miss E. Lucy Braun [too late to enter on map].

South Carolina: Not infrequent in the Blue Ridge and Piedmont, in the counties: Abbeville, Aiken′, Anderson, Greenville′, Oconee, Pickens, and Richland. The name *Phlox nitida* was applied by Elliott[2] to material from the last.

Tennessee: Occasional in the eastern part, specimens having been seen from Anderson′, Claiborne, Cocke, Franklin, Grainger′, Hamilton, Haywood, Knox, Madison, Monroe, Polk′, Roane, and Robertson counties. Most of these represent the northern variety.

Virginia: Known at present only southwestward, the county list being: Alleghany′, Bath′, Bedford, Carroll′, Pittsylvania, Rockbridge, and Wythe.

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[1] Trans. Md. Acad. Sci. Let. 1: 90. 1837.

[2] Sketch Botany S. C. and Ga. 1: 245 [1821].

Ecology.—The habitat relations of this species are essentially the same as those of the next preceding one, *P. ovata,* the best development of both occurring in subacid soil in open woodlands of intermediate successional stages. When all its varieties are taken into consideration, however, the blooming period of *P. carolina* is much longer, extending from early May to late September. Some colonies produce flowers practically throughout the season, others only during one or two of these months.

Variation.—The chief reason for the confusion existing as to the status of *Phlox carolina* lies is its extraordinary variability in habit and foliage, with seeming gradations toward three or four other species. The existence of numerous intermediates between its extreme forms, however, favors its treatment as a single species with several varieties.

Both flowering and sterile shoots are usually erect, attaining a height of 40 to 150 cm. Occasionally a sterile stem will become decumbent, but the prostrate portion is then much longer, and the leaves on the ascending portion are smaller, than in the corresponding shoots of *P. ovata.* The number of nodes below the inflorescence is rarely as few as 5, frequently 7 to 11, and occasionally as many as 15 or even 25. The stems are often red-mottled, especially in fall-blooming forms, and the red pigment may extend into the leaves and calyces, making them bronzy green when fresh, and dull brownish when dried. Pubescence is better developed than on any of the related species, the stem being covered with short stiff hairs, or sometimes with long soft ones; these usually ascend well up the petioles and pedicels, but stop abruptly at the leaf-blades and sepals, rarely spreading also over these.

The lowest leaves always have broad petioles which widen gradually into linear or narrowly elliptic blades, and successively higher ones normally lose the petioles and attain greater blade-width. In some colonies occasional individuals, and in others the majority of the plants, may have the uppermost leaves little broader than linear-elliptic, the aspect being then much like that of *P. glaberrima.* Usually, however, the blades of the upper leaves become elliptic- or oblong-lanceolate to ovate. Locally, especially southwestward, the uppermost leaves may be even more broadly ovate and large-sized than those of *P. ovata* itself.

Phlox carolina, in most of its occurrences, tends to develop a corymbose inflorescence, the outer branches rapidly elongating until they much exceed their subtending bracts. On individual plants, or sometimes in whole colonies, however, these branches remain short, resulting in a broadly or even narrowly conical panicle. Here the gradation is toward *P. maculata,* in which the inflorescence is normally cylindric, though occasionally it becomes conical instead.

In the section key the length of the calyx of *P. carolina* was given as 6 to 11 mm., but this whole range is not met with in any one colony or even within one variety. A separation can be made, in fact, into three length-classes: the calices of northern spring-blooming plants are longest, 8 to 11 mm.; those of southwestern spring-blooming ones intermediate, 7.5 to 9.5 mm.; and those of southeastern fall-bloomers shortest, 6 to 9 mm. The first of these classes resembles in this respect *P. ovata,* the second *P. glaberrima,* and the third *P. maculata.* Other calyx characters, such as extent of union of sepals (relative length of tube and lobes), width of membranous intercostae, etc., seem to vary erratically.

Less variability is shown in corolla-characters. The brilliant phlox-purple color gives way to pale or albino phases somewhat more frequently than in *P. ovata.* The tube and lobes average a little smaller than in the latter, but the range in size is proportionately about the same. The style is usually nearly as long as the corolla-tube, with the anthers lying close to the stigmas, and shows only negligible variation.

Although extreme variants often look like distinct species, so many intergradations occur between them that no key can be drawn up for the identification of isolated specimens, and the species is accordingly here divided into varieties as has been done with several members of sections previously discussed.

VARIETIES AND FORMS OF PHLOX CAROLINA

NODES ABOUT 8; UPPER LEAVES ELLIPTIC TO OVATE-LANCEOLATE; CALYX 8–11, AVERAGING 9.5 MM. LONG; BLOOMING EARLY.

Phlox carolina triflora (Michaux) Wherry, status novus. *P. triflora* Michaux. *P. carnea* Sims. *P. revoluta* Aikin. *P. carolina γ puberula* Bentham. *P. ovata elatior* Gray. N. C. to Ind. and Md.

Forms:

Pubescent. Stem and leaves bearing long soft hairs. Typified by specimen in Academy of Natural Sciences of Philadelphia from Biltmore, Buncombe Co., N. C., Biltmore Herbarium 706a, June 21, 1897. Rare.

Narrow-leaved. Even uppermost leaves linear-lanceolate. Typified by specimen from open woods 3 miles north of Millspring, Polk Co., N. C., collected by E. T. W. May 27, 1929. Occasional throughout.

NODES ABOUT 8; UPPER LEAVES OFTEN BROAD-ELLIPTIC TO OVATE; CALYX 7.5–9.5, AVERAGING 8.5 MM. LONG; BLOOMING EARLY.

Phlox carolina heterophylla (Beauvais) Wherry, status novus. *P. heterophylla* Beauvais ex Brand. *P. carnea* Brand, not Sims. Wide-spread in Ala. and occasional in adjacent portions of Fla., Ga., and Miss.

Forms:

Pubescent. Stem and leaves bearing long soft hairs. Typified by specimen from woods 6 m. southwest of Devenport, Lowndes Co., Ala., collected by E. T. W. June 3, 1927. Occasional.

Pallid. Corolla pink. Typified by specimen from open woods 1 mile east of Oakman, Walker Co., Ala., collected by E. T. W. May 8, 1929. Rather rare.

NODES ABOUT 12 (UP TO 25); UPPER LEAVES OFTEN ELLIPTIC TO OBLONG-LANCEOLATE; CALYX 6–9, AVERAGING 7.5 MM. LONG; BLOOMING LATE.

Phlox carolina altissima (Moench) Wherry, status novus. *P. caroliniana* Hill. *P. altissima* Moench. *P. suffruticosa* Vent. *P. nitida* Pursh. *P. carolina β nitida* Benth. *P. maculata nitida* Chapm. *P. glaberrima suffruticosa* Gray. N. Ga., E. Tenn., and N. C.

Forms:

[Though decidedly variable in stature, foliage, etc., this variety is not readily separable into definite forms].

The type specimen of *P. carolina* in the Linnean herbarium corresponds most closely to this variety.

The morphology and distribution of the above listed varieties suggest their evolutionary relations to have been somewhat as follows: *P. c. heterophylla* first developed in the mountains of Alabama, and its offspring spread in various directions. One descendant proved adapted to conditions farther north, and gave rise to the variety *P. c. triflora;* it evidently arose from a colony showing tendencies toward moderately narrow leaves and unusually long sepals. Another was more successful at higher elevations, developing into *P. c. altissima* with increased stature, shorter calyx, and later blooming season. Still others became so much further differentiated from the parent stock that they are now considered distinct species.

Cultivation.—Phlox carolina had been introduced into horticulture before 1728, for in that year Martyn[1] recorded its being grown in Cowell's nursery at Hoxton. It was also listed by Dillenius[2] in 1732 among the plants in the Eltham garden. The original stock seems to have died out, however, for the material cultivated at Malmaison in 1804, named by Ventenat[3] *P. suffruticosa,* represented a re-introduction by Fraser; and the figures of *P. carolina* published by Sims[4] in 1810, and of *P. carnea* which he[5] proposed as a new species ten years later, were also stated to be based on Fraser plants. Two of the supposedly distinct species pictured by Maund[6] and Sweet[7] shortly afterwards, *P. triflora* and *P. penduliflora,* appear to be merely cultivated forms of the original native *P. carolina.*

For some obscure reason the term *suffruticosa* came to be preferred over any of the others, and is today generally applied in horticultural writings to the species under discussion. In "Standardized Plant Names" Olmsted, Coville, and Kelsey[8] listed nine named forms of this in the American trade; the most widely known of these is "Miss Lingard," a sterile clone which probably originated from a crossing of two of the native varieties. Should horticulturalists come to follow the same code of nomenclature as botanists, however, the earliest name, *carolina,* will have to be used as the specific designation.

The remaining two species of the section *Ovatae,* together with those of the section *Paniculatae,* will be discussed in a future number of Bartonia.

[1] Hist. Pl. Rar. 10, pl. 10. 1728; ed. 2. 4, pl. 9. 1752.
[2] Hortus Elthamensis 1: 205, pl. 166, f. 203. 1732.
[3] Jardin Malmaison 2: no. 107, note. 1804.
[4] Curtis's Botanical Magazine 33: pl. 1344. 1810.
[5] Curtis's Botanical Magazine 47: pl. 2155. 1820.
[6] Botanic Garden 1: no. 6. 1825.
[7] British Flower Garden 1: no. 29. 1823; ser. 2. 1: no. 46. 1830.
[8] Standardized Plant Names 365. 1923.

Notes on the Marine Algae of New Jersey[1]

HORACE G. RICHARDS

During the past few years the writer has been engaged in a survey of the marine invertebrate animals of the coast of New Jersey, with especial reference to the Cape May region (Richards, 1929). During the course of the collecting some attention has been given to the Algae, and it is here intended to record the most conspicuous marine plants of the region.

The Algae of the state have been collected and listed by numerous workers, but nothing about them has appeared in the past twenty years. One who compares the present list with that of Martindale or Collins cannot fail to note that it is much smaller. This is undoubtedly due in part to insufficient collecting, but it is also thought that various factors such as the pollution of the water by oil, sewage, dye-wastes, etc., the draining of the marshes, the development of the land, and marine erosion, have played some part in the depletion of the Algae of the region.

Within the memory of the writer a great many more species could have been collected at Longport, N. J., than may be found there at the present time. As a more specific example in the reduction of the marine flora of the region, we could mention the case of upper Cape May Harbor near Schelengers Landing. During the fall of 1928 a new bridge was built at this point. In the progress of the construction considerable oil was poured into the water. The Algae and many of the marine invertebrates on the dock near-by were soon killed, and even by the following summer when the work had been completed, they had not entirely regained their foothold.

Description of the region. The shore-line of New Jersey from Bay Head to Cape May is made up of coastal islands, separated from each other and from the mainland by bays and inlets. These islands vary in width from a few hundred yards to more than a mile. Above Bay Head there are numerous inlets but the mainland extends down to the ocean. On the bay side of these islands is the salt marsh. The extent of this has been greatly diminished by the very commendable work of the state of New Jersey in attempting to exterminate the mosquito.

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[1] Contribution from the Botanical Laboratory of the University of Pennsylvania. Published with the permission of the Secretary of the Smithsonian Institution.

Eel grass (*Zostera marina* L.) is present in patches in Cape May Harbor and the other inlets of Cape May County, but is not as abundant as it is in Barnegat Bay and the sounds north of Atlantic City.

A rock jetty, a mile long, has been built at the entrance of Cape May Harbor (Cold Spring Inlet). This affords a foothold for animals and plants which might not otherwise be found in the region.

Previous work on New Jersey Algae. The first important work on the marine Algae of the eastern coast of North America is the classical work of Harvey (1852). He divided the flora of this region into four zones, of which one was "Long Island Sound, including under this head New York Harbor and the sands of New Jersey."

Shortly afterwards Mr. Samuel Ashmead (1857) published a catalogue of the marine Algae discovered at Beesleys Point, Cape May County, during the summer of 1855. He recorded five browns, nineteen reds and five greens.

Farlow (1881) in his work on the Algae of New England states that little had been recorded from the shores of New Jersey, and expresses the belief that the sandy shores of the region would support a very poor flora of marine Algae.

Collins (1888) recorded one hundred and seven species of Algae collected by Mr. S. R. Morse at Atlantic City, a number much greater than could possibly be found at this place at the present time.

In 1889 Dr. N. L. Britton edited a catalogue of the plants found in New Jersey. The list of marine forms was contributed by Isaac C. Martindale and includes records from all sections of the coast. This is the most complete list of the marine Algae of New Jersey that has ever appeared.

A brief description of some marine Algae found at Longport, N. J., was given by Mrs. M. S. McCullough in the "Daily Union History of Atlantic City and County" (1900).

Methods. During the early part of the investigation (1928–29) the Algae were obtained by shore collecting or from a row boat in the various inlets and thorofares in the region. During the summer of 1929 and the early months of 1930, through the kindness of Dr. A. E. Parr of the Bingham Oceanographic Foundation (New Haven, Conn.) and by arrangements with the United States Bureau of Fisheries, the writer was able to make numerous dredgings in Delaware Bay and at a few stations in the ocean off Cape May. In 1931 the work of the Bureau was expanded to include both inshore and offshore waters between Cape May and upper Barnegat Bay. The presence of a shifting sandy bottom off this coast does not favor the growth of Algae, and therefore it is not surprising that very few species were dredged offshore. The inland waterways, however, were found to be rather rich in Algae, although in individuals rather than in species. From the observations of May to August, 1931, the whole inland waterway from Cape May to Barnegat Bay might be termed a single association with *Ulva lactuca* and *Agardhiella tenera* the dominant species.

The writer is indebted to Dr. William R. Taylor of the University of Michigan and to Dr. John M. Fogg, Jr., of the University of Pennsylvania for valuable help in the identification of specimens, and for suggestions and encouragement in the course of the collecting.

Sets of specimens are being deposited in the United States National Herbarium and in the herbarium of the University of Pennsylvania.

ANNOTATED LIST OF THE MARINE ALGAE OF NEW JERSEY

MYXOPHYCEAE (Blue-green Algae)

Species of *Lyngbya, Phormidium, Spirulina* and *Oscillatoria* have been found on piles throughout the region. The blue-green Algae are usually found near high water mark, or even slightly above. On piles they are frequently above a zone of *Enteromorpha.*

CHLOROPHYCEAE (Green Algae)

Enteromorpha intestinalis (L.) Link. Common with *E. compressa* on rocks and piles throughout the year; usually between tides; dredged in shallow water in the inland waterways and occasionally in the open ocean.

E. compressa (L.) Grev. Common with the above between tides.

E. linza (L.) J. Agardh. On shells, etc., in the inlets; especially in spring and fall.

E. plumosa Kütz. This and other small species of *Enteromorpha* have been found attached to eel grass in the inlets.

E. clathrata (Roth) Grev. Cape May Harbor, Great Egg River, Forked River.

Ulva lactuca (L.) LeJolis. (Sea Lettuce). Very abundant in all inlets and thorofares in the region, even in very brackish water; dredged in Delaware Bay and the ocean several miles off New Jersey.

Cladophora spp. Various species are common in the region; wharves, mud flats, ditches, etc.; a specimen dredged in Great Sound (Stone Harbor) on August 12, 1931, in 9 feet of water, according to Dr. Taylor "seems to be *C. brachyclona* Mont. or *C. utriculata* Kütz., French rather than Caribbean form."

Rhizoclonium riparium (Roth) Harvey. Cape May Harbor, April 7, 1928.

Chaetomorpha linum Farlow. Dredged in Corsons Inlet and Ludlam Bay in summer of 1931.

Bryopsis plumosa (Huds.) C. Agardh. Rare; attached to wharf at Cape May in September and October, 1928; absent from same locality in 1929 due to oil pollution.

Hormiscia pennicilliformis (Roth) Fries. On Rock Pile, Cape May, March 11, 1928.

Ulothrix flacca (Dillw.) Thur. (sp.?). On rocks between tides.

PHAEOPHYCEAE (Brown Algae)

Ectocarpus siliculosus (Dillw.) Lyngb. Occasionally found in inlets, from May to October.

E. confervoides (Roth) LeJolis. More common than the above; especially in cold weather (December and January.)

Ascocylus orbicularis (J. Agardh.) Magn. (*Myrionema orbicularis* Agardh.). On floating *Zostera,* December 2, 1928.

Pylaiella littoralis (L.) Kjellm. On wood-work; common in late spring and summer.

Elachista fucicola (Vell.) Fries. On *Fucus,* in late summer and fall.

Punctaria plantaginea (Roth) Grev. On beach at Cape May in winter, after storm of January 27, 1929; Beach Haven, February 22, 1931.

P. latifolia Grev. Fairly common in harbor in spring and early summer.

Arthrocladia villosa Duby. Abundant at various stations off Wildwood and Cape May, especially at Five Fathom Bank, 14 miles off Cape May, during the summer of 1931. Was not found at these localities during the summers of 1929 and 1930.

Dictyosiphon foeniculatus Grev. var. *americanus* Collins. Cape May Harbor, May 20, 1928.

Scytosiphon lomentarius (Lyngb.) J. Agardh. Rather abundant in the Harbor in the spring; taken in considerable numbers on April 7, 1928; Beach Haven, February 22, 1931.

Laminaria agardhii Kjellm. (Devil's Apron). Occasionally found washed on the beach near Cape May; common on the rock jetty at Atlantic Highlands, N. J., on August 1, 1928; Beach Haven, February 22, 1931; dredged, Barnegat Bay, Forked River, July 7, 1931, in 1 fathom. Fishermen report that on various occasions they have encountered a dense growth of *Laminaria* at Five Fathom Bank, 14 miles off Cape May (5–9 fathoms). No specimens of this alga were dredged at this locality between 1929 and 1931.

Fucus vesiculosus L. (Rock Weed, Crab Grass, Poppers). Very common on rocks and piles near low water mark throughout the year.

Sargassum filipendulum C. Agardh. (Gulf Weed). Washed on the beach September 26, 1929.

Ascophyllum nodosum (L.) LeJolis. Beach, Cape May Point, October, 1929; dredged Great Sound (Stone Harbor, July, 1931).

RHODOPHYCEAE (Red Algae)

Bangia fusco-purpurea (Dillw.) Lyngb. On wharves, piles and rocks at low tide; most abundant from October to March, although occasionally found in summer. The characteristic winter covering of the rocks.

Porphyra laciniata (Lightf.) C. Agardh. Found floating in the inlets or attached to eel grass; especially abundant in the spring, although occasionally found throughout the year; abundant on the beach at Cape May after a heavy storm on January 27, 1929.

Acrochaetium sp. Species of this genus attached to *Zostera* have been collected in both summer and winter in Cape May Harbor.

Gelidium crinale (Turn.) J. Agardh. Rare; Cape May Harbor, July, 1928.

Chondrus crispus (L.) Lyngb. Typical form found only near Old Bare Shoal, Delaware Bay, in 5 fathoms from May to August, 1931. An abnormal elongate form of the species was dredged in Townsend Inlet, Little Egg Inlet and Absecon Inlet (summer, 1931).

Gracilaria lacinulata (Vahl) Howe. (*G. multipartita* (Clem.) Harvey). Common in summer cast up on the beach, especially after storms; below low tide on piles in Cape May Harbor; dredged (summer 1931) in Cold Spring Inlet, Great Egg River, Little Egg Harbor, Barnegat Bay, and Dennis Cove (Delaware Bay).

G. lacinulata var. *angustissima* Harvey. Found with the above.

Champia parvula (C. Ag.) Harvey. Late summer (1928 and 1929) on eel grass in Harbor; dredged (summer, 1931) Townsend Inlet, off Brigantine (5 fath.) Great Bay, Little Egg Inlet, Barnegat Bay.

Lomentaria uncinata Menegh. On wharves or *Zostera* in Harbor, August and September, 1929; dredged off Brigantine (5 fath.), July 4, 1931; Mullica River (5 fath.), July 6, 1931; Little Egg Inlet (4 fath.), Aug. 14, 1931; Great Bay (5 fath.), July 6, 1931.

Grinnellia americana (Ag.) Harvey. Common in inland waterways (summer, 1931); rare offshore; off Brigantine Inlet (5 fath.); Delaware Bay off New England Creek (2 fath.).

Dasya pedicellata Agardh. (*D. elegans* (Mart.) Ag.) Dredged in large quantities in Barnegat Bay near Lavalette and in Toms River in July 1931 (1 fath.). The water here was practically fresh and the alga was growing in association with *Zannichellia palustris*. No trace of *Dasya* was found in the same localities in August. The only other record of this species is from Great Egg River near Jeffries Landing (also considerably brackish) on July 3, 1931, in 5 fath.

Amphibia rivularis (Harvey) Kuntze. (*Bostrychia rivularis* Harv.). Found on piles below low tide where the water is slightly brackish; collected on roots of *Salicornia* sp. in the back channel at Avalon (Aug. 28, 1928); present throughout the summer and fall. Also collected at Cape Charles, Va. (June, 1928).

Chondria baileyana (Mont.) Farlow. Dredged in Great Bay and Little Egg Inlet, July 6, 1931.

Polysiphonia variegata (C. Ag.) Zanard. Common in the region throughout the summer and early fall; dredged in abundance at practically all inshore stations between Cape May and Barnegat Bay; occasionally dredged in Delaware Bay and in ocean off Barnegat, Atlantic City and Cape May.

P. violacea (Roth) Grev. Rare; Little Egg Inlet, July 6, 1931 (5 fath.)

P. nigrescens (Dillw.) Grev. Rare; occasionally found on beach after heavy seas; dredged Little Egg Inlet (4 fath.), Aug. 14, 1931; Great Sound, Aug. 12, 1931; Barnegat Bay, Aug. 15, 1931.

P. olneyi Harvey (?). Rare; dredged near McCrie Shoal, 7 miles off Cape May (9½ fath.), July 23, 1931.

P. harveyi Bailey. Rare; Barnegat Bay off Waretown, Aug. 15, 1931.

Spyridia filamentosa (Wulf.) Harvey. Dredged in Delaware Bay off Lewes, Del. in 5 fath, Aug. 21, 1929.

Seirospora griffithsiana Harvey (sp. ?). On *Zostera* near Rock Pile, Cape May, Sept. 19, 1929.

Antithamnion cruciatum (C. Ag.) Ag. Nag. On wharves at Cape May in September associated with *Callithamnion roseum* and *Polysiphonia variegata.*

Callithamnion byssoideum Arn. Not common; floating in the harbor on July 12, 1928.

C. roseum (Roth) Harvey. Rather common on wharves at Cape May and Wildwood in September and October; not present in early summer.

C. corymbosum (Eng. Bot.) C. Ag. Attached to *Zostera* in harbor, December 31, 1928.

C. baileyi Harvey. Rare; found on only one occasion on beach at Cape May Point after a severe northeast storm (August 13, 1928).

Ceramium rubrum (Huds.) C. Ag. Very common; found at all seasons of the year attached to eel grass in the inlets or attached to wharves. During the summer of 1931 it was dredged in inland waterways between Cape May and Barnegat Bay, in Delaware Bay, Great Egg, Mullica and Forked Rivers and in ocean off Barnegat, Beach Haven, Brigantine and Cape May (5 to 7 fathoms).

C. strictum (Kütz) Howe. Quite common attached to *Zostera* on wharves during summer and early fall; dredged in inland waterways at Cape May, Great Bay, Longport, Little Egg Inlet; off Brigantine (5 fath.), Delaware Bay near New England Creek (2 fath.)

C. tenuissimum (Lyngb.) J. Ag. With the above on wharves in summer and early fall; dredged Great Egg River and Bay, Townsend Inlet, Barnegat Bay and off Brigantine Inlet (5 fath.)

Agardhiella tenera (J. Ag.) Schmitz. The most abundant red alga in the inland waterways; dredged at every station between Cape May and Toms River; also collected in Delaware Bay and in ocean off Cape May. Present in Cape May Harbor in winter (Dec. 2, 1928, and Jan. 27, 1929).

Melobesia lejolisii Rosan. Frequently found on floating *Zostera* in the harbor in summer and winter.

M. pustulata Lamour. Not as common as the above; on floating *Zostera* in the harbor, Jan. 27, 1928.

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Kyllinga pumila in Philadelphia

RODNEY H. TRUE

Late in September, Mr. James Lambert, Superintendent of the Botanic Garden of the University of Pennsylvania, brought to my attention a plant that had appeared abundantly on a piece of moist ground in the Garden near the pond. A careful comparison with material in the Herbarium of the University showed that it was *Kyllinga pumila* Michx. far beyond any range there seen. This determination was confirmed by my colleague, Dr. John Milton Fogg, Jr. The standard manuals give the northern range as Maryland, Ohio, Illinois, with Virginia and Delaware cited in some cases as the farthest point to the north in the eastern part of the country. An inspection of material in the Herbarium of the Philadelphia Academy of Natural Sciences showed a specimen collected in Sussex County, southern Delaware, by Commons in 1875. Collections were seen from North Carolina, South Carolina and Georgia, and from as far north as Ohio and as far west as Iowa and southward into Kentucky and Tennessee.

It seems clear, then, that the abundant growth on an area perhaps 6 ft. by 12 ft. represents an occurrence well outside of its normal range. One asks himself how this may have come about, and the first suggestion, in the light of Darwin's investigations on the muddy feet of migrant water fowl, is that some water bird coming from the south may have alighted in the Garden on the moist soil near the pond and left these seeds of *Kyllinga* picked up in some similar situation to the southward. Since these plants seeded profusely, it will be a matter of interest to see whether the species reappears next year.

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Notes on a Few Introduced Species in the Philadelphia Local Area

JOHN M. FOGG, JR.

ARTEMISIA BIENNIS. Among the plants frequently collected on ballast ground near Philadelphia 40 or 50 years ago was the biennial wormwood, *Artemisia biennis* Willd. This species, the natural range of which is given in Gray's Manual as Ohio to Tennessee, Missouri, and northwestward, was long known as an introduction at Kaighn's Point, Camden County, New Jersey, and at several localities in Philadelphia County on the Pennsylvania side of the Delaware River, notably from below the Old Navy Yard. One of the last collections of this plant from Camden County was made by Albrecht Jahn, who, in 1898, found it still growing at Kaighn's Point. Since that date, however, there appear to be no records of the plant's occurrence on the New Jersey side of the river, although it has been twice collected in Philadelphia County; having been found by C. S. Williamson at Greenwich Point in 1911 and by Dr. H. B. Meredith at the foot of Wolf Street in 1920. Its recent appearance in a freight yard at Cooper's Point, Camden County, is, therefore, a matter of some interest. The plant was here discovered by William H. Witte of Camden, who reports that it was growing with two other species of the genus, *A. annua* L. and *A. vulgaris* L. Specimens of all three species have been deposited in the herbaria of the Philadelphia Club and the University of Pennsylvania.

CORONOPUS DIDYMUS. Another plant formerly of frequent occurrence on ballast ground and in waste places, but not well represented by recent collections, is the wart cress, *Coronopus didymus* (L.) Sm. Material in the herbarium of the Philadelphia Botanical Club show that within the last 30 years this species has been found at only two localities in the local area. H. L. Fisher collected it at Hatboro, Pa., in 1905, and Harold W. Pretz found it growing as a weed in the pavement at Allentown, Pa., in June, 1930 (Pretz No. 13341). It is entirely possible that *Coronopus* is not so rare as these scattered collections seem to indicate, since the plant is by no means a conspicuous one and might readily be overlooked by collectors. Nevertheless, in view of the marked tendency of the species to become a pernicious weed in lawns, it seems worth while to place on record a third locality for its recent occurrence. This interesting little Crucifer made its appearance on the campus of the University of Pennsylvania in 1924 on the lawn in front of Zoological Laboratory. Since that time it has spread rapidly, occupying the ground bordering Hamilton walk for a distance of about two city blocks, and has so far resisted all efforts to eradicate it.

CARDAMINE PRATENSIS. Although very abundant in regions to the northeast, the bitter meadow cress or cuckoo flower, *Cardamine pratensis* L., is a rare plant within the Philadelphia local area. Material in the collections of the Philadelphia Botanical Club show that it was collected as a weed in a lawn in Annandale, Hunterdon County, New Jersey, by H. L. Fisher in 1905. Twenty-one years later Mr. Fisher again collected the plant in Annandale, this time "in an old yard," and his two sheets in the Club Herbarium dated 1926 indicate, if they be from the same locality as the 1905 collection, the ability of the species to persist when once established. In the Spring of 1924 Harold W. Pretz collected the plant near Laury's Station in Lehigh County, Pennsylvania, where it was found growing in a "wooded, marshy place," a habitat more nearly like that adopted by the species in New England and Nova Scotia. It is now possible to add a third locality to these two, as it was the writer's good fortune to find this attractive plant in low-lying wet ground along Little Tacony Creek near City Line, Oak Lane, Philadelphia County, Pa. This station was first discovered in May, 1924, and observations covering several years showed that the plant was spreading. The locality appears doomed to extinction, however, for the waters of the creek have been diverted and the ground is rapidly being filled in by artificial means. Specimens from the original collection (Fogg No. 648) have been deposited in the Philadelphia Botanical Club and the University of Pennsylvania herbaria.

UNIVERSITY OF PENNSYLVANIA.

Gift of Schweinitz Record-Books

On the afternoon of April 7, 1931, word came from the office of the Academy announcing a visitor who had brought certain old record-books that might be of some interest to the Botanical Department. When he was introduced to our Herbarium, I found that we had the pleasure of welcoming Mr. Eugene A. Rau of Bethlehem, Pennsylvania, who nearly half a century ago made many collections of Fungi and other Cryptogamic plants, and whose contributions entered so largely into the historic sets of Fungi distributed by Ellis and Everhart.

What had caused his visit was revealed as he carefully opened a package and showed the first of a series of aged brown record-books. The handwriting was unmistakable—I started as I realized that it was certainly that of Lewis David von Schweinitz, the pioneer of American mycology and the assembler of so large a private herbarium of flowering plants that when, after his death in 1834, it came to our institution it was found to far exceed all the Academy's previous collections. The Schweinitz' plants were all labeled or relabeled in his characteristic flourishes, and unfortunately abbreviations were constantly used, many of which have been unintelligible.

As the treasures were laid before me, my amazement grew that such records had survived the years. It seemed that many years ago they had been given to Mr. Rau by Rev. Robert de Schweinitz, the son of the botanist.

First may be mentioned two booklets that had come to Schweinitz from a still older time: a "Flora Nazarethena spontanea collecta in annis 1787 & 1788 a Sam: Kramsch" to which had been added "Supplemento addito anno 1797 a Christⁿ. Denke," being a Latin "Flora of Nazareth" on the Linnean arrangement; and the second work an index to this, an "Index Florae Nazarethaneae," following the same sequence but listing only the binomial names of the species.

In Schweinitz' own handwriting are six books and booklets. The largest of these, clearly the work of many years, is a "Flora Salemitana," which bears the satisfying subtitle of "Sistens / Plantas et Vegetabilia omnia / huc usque in agro / Salemitano – Carolinae septentrionalis – / observata; / Radio triginta millium / ex Carolinae septentrionalis / Comitatibus / Stokes, Surry, Guilford, Rockingham et / Rowan"; then, following a dash: "Auctore L. D. v. Schweinitz / 1821. / Aprili fine;" and lastly the supplementary addition: "In margine additas invenies / Plantas quae ex Bethlehem Pensylvania / loco natali observantur." Our Herbarium has many specimens of Schweinitz labeled merely "Salem," a designation that we had learned from experience must include a considerable portion of North Carolina; and as many more labeled "Beth" or rarely "Bethlehem," which we knew had come from somewhere near Bethlehem, Pennsylvania. Now for the first time we have learned that "Salem" covered a radius of thirty miles around that town, and are able to tell the exact location of many an interesting specimen. Schweinitz planned a careful flora; this book includes both the "Phaenogamia" and "Cryptogamia," and under the latter the classes of "Filices," "Musci," "Algae aquaticae aquae dulcis," and "Lichenes," the Fungi being evidently omitted because of his treatise of those of North Carolina that was actually published by the American Philosophical Society. Under the Phaenogamia and all the classes of the Cryptogamia in the "Flora Salemitana" new species were named and described; now at last we have obtained the descriptions for the many peculiar names that accompany Schweinitz' specimens in our Herbarium. It is too bad that the "Flora Salemitana" was not published a century ago, so that these names might have acquired technical validity.

The other record-books are all small, and are merely lists. There is an "Index / Herbarii Europ. & Americani / April 1822," which lists both flowering and flowerless plants. There is a special "Index Herbarii Europ.," and a "Flora Europaea ex Willdenow," the latter doubtless merely recording the plants acquired for Schweinitz' herbarium from the great German botanist. Mycologists will be interested to learn that there is also an undated "List of the American Fungi in my Collection."

The last record-book is of another nature. It bears no title, but proves to be concerned with Schweinitz' many correspondents. First these are grouped by initial letters from A to Z, but not alphabetically under each letter; for each correspondent is given an address. The names so entered require 21 pages, and Schweinitz' handwriting is small. Then follows a 2-page list of "Botanical Correspondents," similarly executed. This short list promises to be of exceeding value to us as Schweinitz' specimens came from all parts of the world and he had the unfortunate habit of discarding the collector's labels, merely copying the technical name with the country and collector, the latter items often greatly and cryptically abbreviated. As he received plants from the most important of his contemporaries, as Ledebour's specimens from the Altai region and Wallich's from India, we are hopeful of recovering much important data. Finally the localities at which he had correspondents are listed by themselves, classified under "America" and "Europe."

F. W. P.

The Botanical Interest of Dr. Henry Leffmann

Although Dr. Leffmann has left the request, so in keeping with his modesty of nature, that there should be no formal obituary telling of his life and work, it seems but due to our members to place upon record some statement of his interest in botany and of the many years that he knew the Academy of Natural Sciences. Botany was but a lesser one of his many interests, and he did not undertake in it such original productive study as marked his career in chemistry and medicine.

A minute-book, now preserved in our Botanical Department, tells of the organization of the Botanical Section of the Academy at a meeting held June 20, 1876. A petition therefor had been made a week earlier, and among the signers, along with John H. Redfield, W. W. Ruschenberger, M.D., Charles E. Smith, M.D., Josiah Hoopes, Charles F. Parker, William M. Canby and others, occurs the name of Henry Leffmann, M.D. Born in 1847, he was then twenty-nine years of age. The Section was formed with Dr. Ruschenberger, Director; Thomas Meehan, Vice Director; Isaac Burk, Recorder; Charles F. Parker, Conservator; and Dr. Henry Leffmann, Secretary.

Dr. Leffmann keenly enjoyed telling his reminiscences of those stirring days, when C. F. Parker and J. H. Redfield, who soon succeeded to the post of conservator, commenced the mounting of the historic collections of the Academy. They found the botanical department of the Academy—to quote a contemporary comment of Professor Gray of Harvard—a "dust-heap" of unmounted specimens tied into bundles and scarcely accessible, and Mr. Redfield left it after nineteen years an herbarium of mounted sheets, carefully filed for reference, and stored in convenient cases. But in this labor the young physician and professor could not long bear a part, as his busy life soon called him away from botany and the Academy.

It was so recently as 1922, when his active life-work had been finished and he was seventy-five years old, that Dr. Leffmann returned to his early interest by joining the Philadelphia Botanical Club. Soon after that time, at a meeting of the Club the curator of the Botanical Department suggested the desirability of arranging the American specimens in the Main Herbarium of the Academy within each species-cover according to a definite sequence of states and countries. Several members of the Club volunteered their help in accomplishing this, among them Dr. Leffmann. The others selected families of moderate size, and I regret to say soon tired of the task, but not so Dr. Leffmann. He asked to arrange the Compositae, the largest family of flowering plants, and for some three years spent portions of several days each week in our herbarium. Eventually he completed the assignment (of 27 cases of crowded specimens), and then sorted the Lobeliaceae and other families down to Rubiaceae.

After 1925 or 1926 we saw him less frequently, although occasionally he still attended or addressed our Club meetings. But increasingly he was confined to his home, or could only reach the Academy by day. Finally on December 25, 1930, occurred his death at the ripe age of nearly eighty-four years.

While to those of us who knew him only in these later years Dr. Leffman seemed in body an old man, of no one could it be more truly said that he could never be other than young in spirit. We could have no keener mind at our meetings, nor a more genial and interested friend aiding in the Academy's daily tasks.

General Notes

Recent Work in the Local Herbarium. The largest recent accessions of specimens have come from Walter M. Benner, Hans Wilkens, Hugh E. Stone, and Dr. John M. Fogg, Jr. During the year there has been considerable progress in comparing, mounting and incorporating the large series of local collections made by the Club's Curator. Both Mr. Long and Dr. Benner have been engaged on these throughout the year.

Northwestern Expedition for Scrophulariaceae and Polemoniaceae. Aided by a grant from the National Research Council, Dr. Edgar T. Wherry and Dr. F. W. Pennell spent over three months, from early June to mid-September, on an automobile journey through the northwestern United States. While the trip was undertaken especially for the study of the Scrophulariaceae, each followed his special interest, and the experience contributed toward the knowledge of two families of flowering plants. After crossing rapidly from Philadelphia, collecting began in Nebraska and Wyoming, but nearly all the summer's work lay westward, in comparing the flora of the different mountain areas of Idaho, Oregon and Washington. Unfortunately the season was abnormally dry and followed a winter of light snowfall, so that the alpine flora came early and had passed to fruit by mid-summer. Although this curtailed the results of the expedition, yet some 1,200 collections were made and a wide field-acquaintance secured. Visits were paid to various botanical centers and herbaria were consulted both in the northwest and on the return journey.

Some Notes from the Main Herbarium. The Main Herbarium of the Academy includes plants from the entire world, outside of the limited area covered intensively by the Local Herbarium.* In telling of Dr. Leffmann's botanical interest we have already mentioned the mounting of the specimens for the Main Herbarium, and his zeal in sorting them geographically.

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* For a list of the counties included in the area covered by the Academy's Local Herbarium see Bartonia 8: 35. 1924.

The good work commenced by Dr. Leffmann has been continued by a number of volunteers, aiding members of the Academy's staff, until now nearly all our American specimens of flowering plants have been arranged. Special folders had earlier been provided for species of North, and also of South America, a task to which the late curator Stewardson Brown devoted much time; our recent problem has been to make the accumulation of sheets within these folders just as accessible as possible by having them sorted into a definite geographic sequence of states and countries. Dr. Wherry has sorted the Polemoniaceae, Dr. Fogg the Menthaceae, Dr. Pennell the Scrophulariaceae and Solanaceae, Miss Lois M. Otis most of the Leguminosae, Mrs. J. R. Gallagher the Ericaceae, while two assistants from the University of Pennsylvania, Miss Grace M. Tees and Miss Kathryn Smith, have arranged the material of various families while they have been distributing specimens to the cases. The most assiduous of recent workers, however, has been Mr. William R. Keeney, who for two years has given one day each week to the work, thus reviewing the Monocotyledones and many families of Dicotyledones. The Pteridophyta have been arranged both for the New and the Old Worlds by the curator in charge of them, Mr. Arthur N. Leeds.

Another task actively undertaken this year (1931) has been the cleaning of the old sheets in the Herbarium. When some forty or fifty years ago Mr. Redfield and his associates achieved the mounting of the historic collections of the Academy, they had the plants attached to stiff white papers and then filed in wooden wall cases. In time the cases warped and permitted dust to enter, while the Academy's location, between the Pennsylvania Railroad and the Baldwin Locomotive Works, assured an abundant supply of smoke and dust. Stewardson Brown realized the situation, and in 1907 commenced changing the Main Herbarium to tight metal (tin) cases, a transfer completed by 1924. These new cases prevent the ingress of dust and of voracious insects as well, but they have left us the problem of removing the grime from the sheets brought from the wooden cases. This is being solved by the use of a wall-paper cleaner, known as "Climax Cleaner." Years ago one of our zoological colleagues discovered its merits, and we have long been making some use of it. But this year we have started the task of cleaning the entire Main Herbarium, and already half of it, the contents of 100 cases, have been worked over. The result is surprisingly successful, and sheets that were nearly black are so transformed that, if the history were not known, few would suspect that their color had ever seriously departed from their original whiteness.

Program of Meetings during 1930

Date	Subject	Speaker	Attendance
Jan. 23	Collecting in Potter County, Pennsylvania	Lee Sowden.	
	Local species of *Andropogon*	Hugh E. Stone	16
Feb. 27	Grasses	Dr. E. M. Gress	16
Mar. 27	Botanizing in the Tyrolese and Swiss Alps	Dr. John M. Macfarlane.	
	A new species of *Polygala*	Dr. Francis W. Pennell	37
Apr. 24	Botanizing in the Everglades	Dr. Robert R. Tatnall	25
May 22	Plant life in the Caucasus and the Desert of Kara Kum, Turkestan	Dr. William Seifriz.	
	Local species of *Antennaria*	Bayard Long	19
Sept. 25	Reports of summer work by various members		17
Oct. 23	Color photography as applied to the flora of New Jersey	Dr. M. A. Chrysler	25
Nov. 20	General botanical impressions of Europe and the Fifth International Botanical Congress	Dr. John M. Fogg, Jr.	
	Work of the Subsection on revision of International Rules of Botanical Nomenclature	Dr. Francis W. Pennell	16
Dec. 18	The Okefinokee Swamp of Georgia	Dr. Francis Harper.	
	Local species of Polemoniaceae and Hydrophyllaceae	Dr. Edgar T. Wherry	29

Officers and Members of the Philadelphia Botanical Club, 1931

WALTER M. BENNER, *President*
HARRY W. TRUDELL, *Vice-President*
HUGH E. STONE, *Secretary*
ARTHUR N. LEEDS, *Treasurer*
BAYARD LONG, *Curator*

ACTIVE MEMBERS

	Elected
Joseph W. Adams, 108 West Wishart St., Philadelphia, Pa.	1925
Wharton B. Aucott, 746 Tyson Ave., Ardsley, Pa.	1928
Edwin B. Bartram, Bushkill, Pa.	1906
J. Russell Bebler, 135 E. Phil Ellena St., Germantown, Phila.	1919
Dr. Walter M. Benner, 5636 Loretta Ave., Frankford, Philadelphia	1912
Carl E. Bliss, 65 Randolph Place, South Orange, N. J.	1924
Carl Boyer, Wagner Institute, 17th St. & Montgomery Ave., Phila.	1926
J. Claudius Boyle, 223 Kenmore Rd., Brookline, Pa.	1919
Dr. Herman Burgin, 212 High St., Germantown, Philadelphia	1915
James J. Burke, Addingham, Pa.	1919
Milton Campbell, 4401 Pine St., Philadelphia	1928
Prof. M. A. Chrysler, Rutgers University, New Brunswick, N. J.	1931
F. Van Buren Connell, 500 Homewood Ave., Narberth, Pa.	1924
Joseph Crawford, 16 E. Stewart Ave., Lansdowne, Pa.	Founder
Dr. Herbert J. Darmstadter, 4617 York Road, Philadelphia	1926
Robert R. Dreisbach, Midland, Mich.	1922
L. J. Duersmith, 572 Walnut St., Columbia, Pa.	1931
Dr. John W. Eckfeldt, 502 Kathmere Rd., Brookline, Pa.	1892
Howard W. Elkinton, 6514 Germantown Ave., Philadelphia	1931
Mrs. Harold Evans, Awbury, E. Washington Lane, Germantown, Philadelphia	1931
Dr. John M. Fogg, Jr., University of Pennsylvania, Philadelphia	1921
Arthur M. Henry, U. S. Appraisers Stores, 134 S. 2nd St., Phila.	1927
F. F. Huber, Pennsburg, Pa.	1911
William R. Keeney, 318 E. Lancaster Ave., Wayne, Pa.	1930
Dr. Ida A. Keller, 4424 Osage Ave., Philadelphia	1892
Addison D. Kern, 222 West Linton St., Philadelphia	1929
Miss Natalie B. Kimber, 538 E. Locust Ave., Germantown, Phila.	1928
Rev. William U. Kistler, 118 Main St., Pennsburg, Pa.	1911
Prof. W. A. Kline, Ursinus College, Collegeville, Pa.	1911
Charles E. Knopf, 6129 N. Franklin St., Philadelphia	1931

Dr. Henry A. Laessle, 5900 Market St., Philadelphia	1894
Dr. H. Pearce Lakin, 14 E. Main St., Lansdale, Pa.	1906
Dr. Charles H. LaWall, 636 Race St., Philadelphia	1896
Arthur N. Leeds, 5321 Baynton St., Germantown, Philadelphia	Founder
Morris E. Leeds, 5321 Baynton St., Germantown, Philadelphia	Founder
Dr. Harry A. Lloyd, 200 N. 35th St., Philadelphia	1931
Bayard Long, 250 Ashbourne Rd., Elkins Park, Pa.	1906
Mayne Reid Longstreth, 1420 Chestnut St., Philadelphia	1892
Dr. Donald MacFarlan, Ardmore, Pa.	1929
Frederick McDowell, 4840 Roosevelt Blvd., Philadelphia	1930
Rogers McVaugh, Swarthmore College, Swarthmore, Pa.	1930
Adolf Müller, Box 66, Norristown, Pa.	1920
Dr. Samuel C. Palmer, Swarthmore College, Swarthmore, Pa.	1929
T. Chalkley Palmer, Media, Pa.	1927
Dr. Gideon H. Patton, 61 E. Penn St., Germantown, Philadelphia	1929
Dr. Francis W. Pennell, Moylan, Pa.	1910
Edward Pennock, 3609 Woodland Ave., Philadelphia	1927
Harold W. Pretz, 123 S. 17th St., Allentown, Pa.	1909
John W. Prince, 5439 Berks St., Philadelphia	1924
Evan Randolph, Seminole & Chestnut Aves., Chestnut Hill, Phila.	1917
George Redles, 207 E. Wister St., Germantown, Philadelphia	1917
Dr. W. H. Reed, Jeffersonville, Pa.	1892
Charles C. Roberts, Lansdowne, Pa.	1926
Lee Sowden, 3823 Oak Rd., Germantown, Philadelphia	1901
Dr. Walter Steckbeck, University of Pennsylvania, Philadelphia	1925
Hugh E. Stone, Haverford, Pa.	1892
Dr. Witmer Stone, Academy of Natural Sciences, Philadelphia	Founder
J. Fletcher Street, 1120 Locust St., Philadelphia	1918
Dr. Robert R. Tatnall, 1100 W. 10th St., Wilmington, Del.	1928
Arthur H. Thomas, Haverford, Pa.	1928
Mrs. W. Hersey Thomas, 145 E. Gorgas Lane, Mt. Airy, Phila.	1929
Warner R. Thomas, Custom House, Philadelphia	1924
Horace E. Thompson, 5016 Schuyler St., Germantown, Philadelphia	1920
Harry W. Trudell, 2030 E. Madison St., Philadelphia	1915
Prof. Rodney H. True, University of Pennsylvania, Philadelphia	1925
Clarence E. Varnum, Atco, N. J.	1923
Robert F. Welsh, 132 S. 4th St., Philadelphia	1909
Dr. Edgar T. Wherry, University of Pennsylvania, Philadelphia	1925
Dr. Edward E. Wildman, 4331 Osage Ave., Philadelphia	1931
Hans Wilkins, 241 S. 11th St., Reading, Pa.	1928
William H. Witte, 16 York St., Camden, N. J.	1929
Miss Mary F. Wright, Ambler, Pa.	1928

HONORARY MEMBERS

GEORGE W. BASSETT, Secane, Pa.	*1904
SAMUEL NEWMAN BAXTER, Fernhill Park, Germantown, Phila.	*1918
DR. JOSEPH S. ILLICK, Mont Alto, Pa.	1925
EUGENE A. RAU, Bethlehem, Pa.	1931
SAMUEL S. VAN PELT, 59 Bethlehem Pike, Chestnut Hill, Phila.	*1902

CORRESPONDING MEMBERS

CHARLES C. BACHMAN, Slatington, Pa.	1908
MRS. ELIZABETH G. BRITTON, N. Y. Botanical Garden, New York City	1895
DR. NATHANIEL LORD BRITTON, N. Y. Botanical Garden, New York City	1892
OTWAY H. BROWN, Cape May, N. J.	1908
STEWART H. BURNHAM, Cornell University, Ithaca, N. Y.	1911
PROF. M. L. FERNALD, Harvard University, Cambridge, Mass.	1929
DR. A. ARTHUR HELLER, Chico, Calif.	1893
DR. HAROLD ST. JOHN, University of Honolulu, Honolulu, Hawaiian Islands	1927
CHARLES F. SAUNDERS, Pasadena, Calif.	1893
DR. JOHN K. SMALL, New York Botanical Garden, New York City	1893
DR. WILLIAM RANDOLPH TAYLOR, University of Michigan, Ann Arbor, Mich.	1921
DR. CAMPBELL E. WATERS, Washington, D. C.	1904
DR. H. W. YOUNGKEN, Mass. College of Pharmacy, Boston, Mass.	1918

RECENTLY DECEASED MEMBERS

	Died
DR. HENRY A. LANG, Active	May 27, 1930
DR. HENRY LEFFMANN, Honorary	Dec. 25, 1930
EDWIN I. SIMPSON, Active	Oct. 31, 1930
JOHN J. TYLER, Honorary	Oct. 29, 1930

* Elected Active Members on these dates.

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BARTONIA

PROCEEDINGS OF THE
PHILADELPHIA BOTANICAL CLUB

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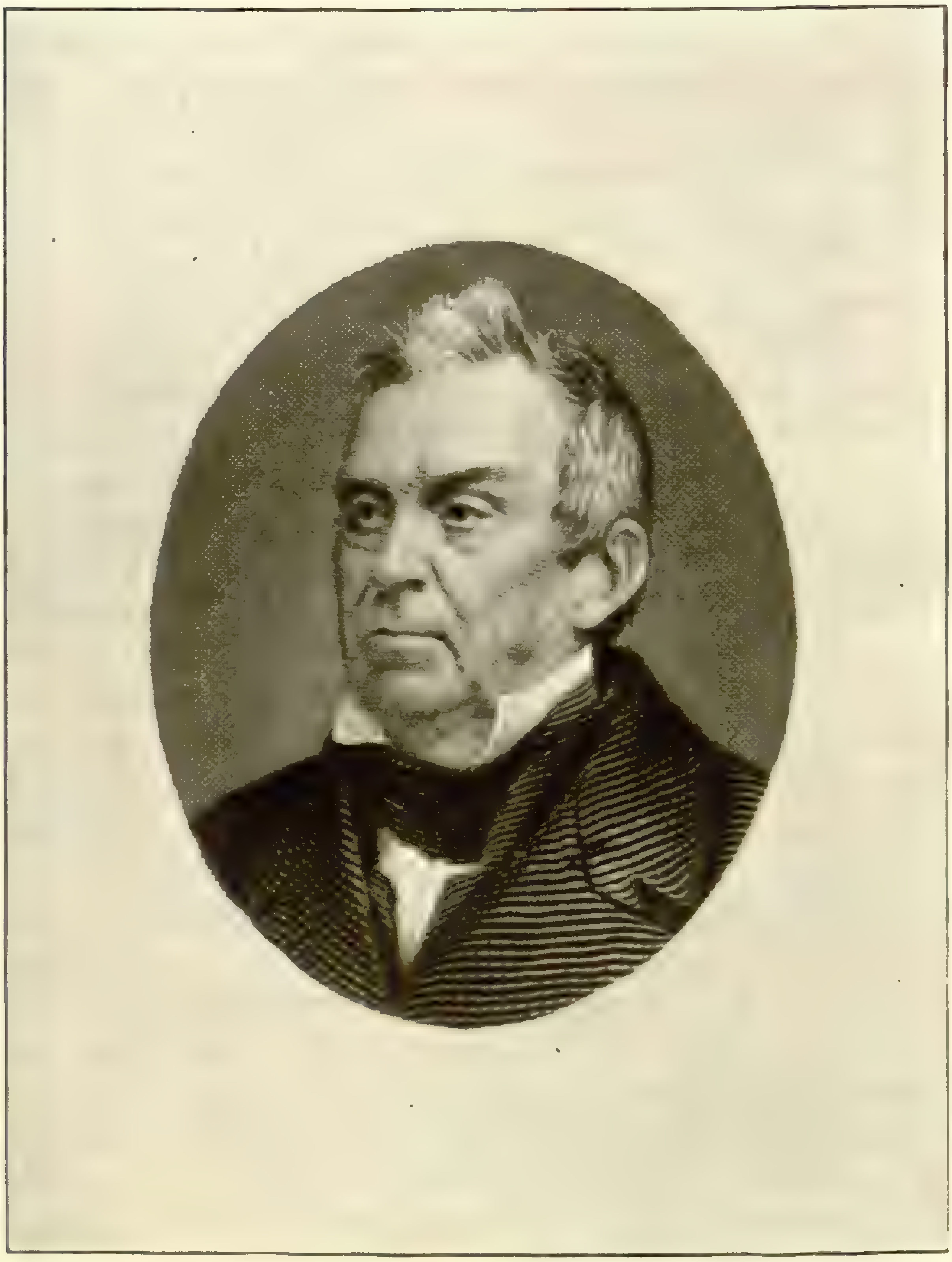

WILLIAM DARLINGTON
(1782–1863)

BARTONIA

PROCEEDINGS OF THE PHILADELPHIA
BOTANICAL CLUB

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Dr. William Darlington, Physician and Botanist

William T. Sharpless

From early colonial days to the middle of the past century a simple and remarkably homogeneous society existed in rural southeastern Pennsylvania. There were few rich or few poor, and distinctions of class were scarcely known. Large families, so frequent then, distributed their members among smaller families to aid in the farm work. When the shoemaker or tailor made his rounds, he remained in each household until its needs had been supplied. The community was generally prosperous, for by intelligent exertion the modest needs of the time could be easily satisfied. The people were nearly all Quakers or of Quaker stock, and, to a large extent, practiced a type of religion simple in form and mystical in character but closely related to conduct and life.

Before the advent of public schools there were private schools, of which many were formed by the association of several families to be instructed by one of their own number. There were a few academies of higher learning. The average of intelligence was high, and the letters of that day show a surprising acquaintance with good literature and an ability to use the English language with accuracy and fine expression.

It was into this society that William Darlington was born on April 28, 1782, just one hundred and fifty years ago, and its impress he carried throughout life. He was the fourth in descent from Abraham Darlington, who was born in

Cheshire, England, in 1690, and as a young man came to Pennsylvania; beside being farmer and saddler, it is said that the immigrant had some skill in treating the physical ailments of his neighbors, and that he practiced bleeding, leeching and bone-setting. Dr. Darlington's other ancestors were Hillborns, Brintons and Townsends—all good Chester County names and all Quakers from England.

Young Darlington grew up on his father's farm near Dilworthtown, then in Chester but now in Delaware County, Pennsylvania. He attended the school of John Forsythe at Birmingham Meeting House, where under skillful guidance he acquired the rudiments of an English education. His teacher, who in after years was associated with him in various philanthropic and educational projects, was ever proud of his distinguished pupil.

William tired of what he considered the drudgery of farm life, and with much difficulty persuaded his father to let him study medicine; accordingly in 1800 he entered the office of Dr. John Vaughan, of Wilmington, Delaware, as a pupil. Here he studied French as well as medicine, and thus commenced his passion for the learning of languages. Later he studied Latin, Spanish and German, and became proficient in all of them. So strong was his zeal for language study that he acquired his knowledge of Spanish after he was fifty years of age.

During his residence in Wilmington the yellow fever visited the town and it is said that the only physicians who remained at their post were Dr. Vaughan and his pupil, William Darlington.

The winters of 1802–3 and 1803–4 young Darlington attended the medical lectures at the University of Pennsylvania, and in June, 1804, he received the degree of Doctor of Medicine at that institution. It is believed that he was the first citizen of Chester County who took that degree at the University. The subject of his thesis was "The Mutual Influence of Habits and Disease"—an essay which received the approval of Dr. Benjamin Rush, one of his instructors. During his medical studies he attended the botanical lectures of Dr. Benjamin Smith Barton, and thus began the study of the science which was to become the chief source of his fame.

After graduation he returned to his home near Dilworthtown and engaged in the general practice of medicine, being the first man with a medical degree to practice in Chester County. It was his custom at this time to keep a journal in which he entered an account of his patients—their ailments, his treatment of them, and the results. This journal, covering the period from 1804 to 1813, has been preserved. In it he also records the state of the weather, miscellaneous items of interest, and his reflections on things in general.

Illustrating the therapeutic methods in use at that time, under date of November 1, 1804, he records: "Thomas Woodward was attacked yesterday with a very malignant grade of fever—with great determination to the head and pain and oppression at the precordia. His pulse was slow, seldom, laboring and depressed—intellect confused. I drew about ten ounces of blood in a small slow stream—it was black, and livery as soon as it came into contact with the bowl. He soon acquired a chilliness after the bleeding—with a jerking motion of his body and arms—his pulse rather more frequent —great restlessness—his face and neck cold—in about three quarters of an hour when I judged the system to have recovered a little from its depressed state, I bled him again to the amount of eleven ounces; while the blood was flowing he became easy, warm, and in fact fell into a gentle sleep—from which he soon wakened, quite composed in his mind and rational. I felt astonishingly relieved. As his pulse continued active I proposed another bleeding—but he fainted at the thought of it, so I gave it over. This morning I gave him antimonial powder. He continued better, he even walked out today! The practice in this case was a complete illustration of the inestimable theory of Professor Rush, respecting the depressed state of the system. To that illustrious teacher I owe my present happy sensations on this occasion—and in all probability, my patient owes his life to my having been instructed by the enlightened Professor of the practice of Physic in the University of Pennsylvania.''

Under date of July 24, 1805, he makes this entry: ''John Davis's Uxor has been complaining of pain in her head and has been low spirited for 3 or 4 days—yesterday grew worse and this morning was quite raving. I saw her soon after noon. She was more composed but had a high fever and her eyes rolled with all the wildness of a maniac. Sighed deeply and talked strangely. . . . Bled her 16 or 18 ounces . . . and ordered quiet.''

''Sunday 30th, John Davis's Uxor has got a little better but is not well. I bled her again and reduced her fever but her ideas are still deranged—have discontinued attention as her husband thinks 'Nothing but devilishness ails her.' ''

Physicians of the present time sometimes feel like making a similar diagnosis in some of their cases but the description of the symptoms, especially the high fever, seems scarcely to justify her husband's unsympathetic judgment. Incidentally, it throws an interesting sidelight on the family life of the Davises.

In the year 1805 he received the appointment as surgeon to a regiment of militia—this resulted in his disownment by the Society of Friends. We may anticipate at this point and say that through the greater part of his life he was not a member of any religious body. In his old age, and shortly after the death of his wife, he became a member of the Episcopal Church.

In 1806 he received an appointment as surgeon to an East India merchantman and made a trip to Calcutta. There is nothing in his journal concerning this trip except an account of his attendance on the members of the ship's crew, though a few years later some observations made during this voyage were published in the form of familiar letters to the ''Analectic Magazine'' (in volumes 13 and 14). After returning from this voyage, he continued in practice for a short time in Dilworthtown, but in 1808 he removed to a house he had purchased in West Chester, where he resided (when in Pennsylvania) during the remainder of his life. In the same year he married Catharine Lacy, a daughter of General John Lacy, who had served as an officer in the Revolutionary War. He continued in the practice of his profession for several years after coming to West Chester, and soon identified himself with the social and business life of the community.

Under date of April 22, 1809, he says: "Last evening completed *one year* since I removed to West Chester. Business has been quite as good and encouragement as flattering as I could have expected. The amount of what I have *booked* in the time is 543 dollars 50 cts. I have lived comfortably and happily—and all I ask of indulgent heaven is a continuance of the same." This illustrates his contentment with a small income and shows what a doctor in good practice at that time might expect to collect.

In 1811 he was one of the founders of the West Chester Academy and for many years was secretary of the board. When the War of 1812 was declared and troops were called to defend Philadelphia against the British, who were then in Chesapeake Bay, he volunteered and was chosen major of the first battalion of his regiment. He did not see active service, however, and on returning home his fellow citizens, appreciating his public spirit, without solicitation on his part elected him to the 14th Congress of the United States. He failed in election to the 15th Congress but was re-elected to the 16th and 17th. He took an active part in the debates concerning slavery and especially the Missouri Question. He was earnestly in favor of the restriction of slavery and was afterward an ardent abolitionist and transferred his political affiliations from the party of Jefferson, in which he had grown up, to that of Clay and Webster—being a Whig and afterward a Republican. He was active in the establishment of the Bank of Chester County in 1814 and one of its first board of directors. In 1830 he became president of this bank, and remained in this position until his death thirty-two years later. In 1825 he was appointed to the first board of Canal Commissioners of Pennsylvania, along with Albert Gallatin and others, and was president of the board.

He seems to have kept up his interest through these busy years in the study of the natural sciences, especially botany, although there is no reference to this interest in his journal, and in 1826, with some of his friends, he assisted in organizing the Chester County Cabinet of Natural Sciences, of which he was the first president. This organization encouraged the study of the sciences by giving popular lectures on subjects connected with its work and made a large collection of objects of natural interest, which is now in the custody of the State Teachers' College at West Chester.

His ledger from the years 1812 to 1816 has also been preserved. For the most part it was kept in Latin. It shows that he had a large practice. He kept a careful record of his visits and the service rendered. The charge for "Vsection" (venesection) occurs with surprising frequency. It seems to have been the sheet-anchor of his therapeutics. The charge for this was from fifty cents (50c) to a dollar ($1.00). We frequently meet with the charge "Vi et concil et med" which, extended, would mean "Visitas et concilium et medicina." He was paid sometimes in cash, but very often in services or supplies. "One bushel of lime," "Ten bushels of potatoes," "Hay and oats for my horse," "Shoeing my horse," "An oven peel," were some of the credit entries, and one patient, a negro, adjusted his account in full by "shaving me." Jonathan Gause, a famous educator of that day, received credit "By tuition of my son from October 1813 to April 1815 @ three dollars ($3.00) per quarter—$14.00." These items may not seem important now, but it is interesting to find under date of February 9, 1812, that he visited "per noctem" the great-grandfather of the writer of this sketch, who lived four miles from West Chester, and charged two dollars ($2.00) for the service. It is also satisfactory to know that the doctor was paid for this service in cash.

About 1830, with some other public-spirited citizens of West Chester, he assisted in surveying a route from West Chester to connect with the main line of the Pennsylvania Railroad at Paoli. He superintended the construction of this road and became its first president.

He was active in establishing the Chester County Agricultural Society and the Chester County Horticultural Society at about this time.

In 1828 he was chiefly instrumental in establishing the Chester County Medical Society, one of the first county medical societies in the state. He was its first president and remained in that position until 1852, when he resigned and was made an honorary member. This society is still in active operation, having in 1928 celebrated the 100th anniversary of its founding. It was in this society in 1847 that a resolution was introduced by Dr. Wilmer Worthington, a pupil of Dr. Darlington, which directly led to the establishment of the Medical Society of the State of Pennsylvania, a society that has been of great value to the physicians and the people of the state by extending medical knowledge, by maintaining ethical standards of medical practice, and by promoting useful medical legislation. It now has a membership of about eight thousand.

Dr. Darlington does not seem to have practiced his profession after he retired from Congress in 1822. At about that time the Secretary of War appointed him one of the visitors at West Point, a position which he held but a short time. We have seen that in 1825 he was appointed a Canal Commissioner of Pennsylvania. As the duties of the position were arduous and as there was no salary attached, he gave it up in 1827 and his personal friend, Governor Shulze, appointed him Prothonotary and Clerk of the Courts of Chester County. He held this position until he became president of the Bank of Chester County in 1830.

In 1826 Dr. Darlington published his first botanical work, the "Florula Cestrica." It is dedicated to Rev. Lewis D. von Schweinitz, of Bethlehem, Pennsylvania. This dedication is worth quoting in full:

> "Dear Sir:
>
> I am conscious that the dedication of a performance of this grade is but an equivocal compliment to a Botanist of your distinguished attainments; but I could not forego the opportunity, thus presented, to testify the deep sense which I entertain of your kindness and liberality, so re-

> peatedly manifested, in aiding me in my investigations of our more difficult plants. It is but justice to say, that whatever of accuracy there may be, in the determination of those plants, is mainly owing to your obliging revision of that portion of my Herbarium. As for the errors, deficiencies, and temerarious innovations, which may be observed in the work,—it is perhaps needless to add, that they are all my own.''

It is dated April 28, 1826, which was the forty-fourth birthday of the author. He calls it a ''Catalogue of the Phanogamous Plants growing in the vicinity of the Borough of West-Chester in Chester County, Pennsylvania, with brief notices of their properties, and uses, in medicine, rural economy, and the arts.''

When did Dr. Darlington become seriously interested in the study of botany? This can be rather definitely fixed by a letter dated January 15, 1817, from his fellow botanist, Dr. William Baldwin, who was also his classmate when both were students of medicine at the University of Pennsylvania in 1802. This letter says: ''It gives me great pleasure to learn that you are becoming a devoted lover of Botany.'' He apparently had a casual interest in the science since he attended the botanical lectures of Dr. B. S. Barton while a student of medicine as he states that in 1806 he had found a specimen of bladderwort (*Utricularia vulgaris*) which he had sent to Dr. Barton for identification, and in February, 1817, Dr. Baldwin writes (while Dr. Darlington was in Congress at Washington): ''It gives me great pleasure to find that in the midst of your political and professional concerns you are willing to devote your leisure hours to the study of the plants.''

By 1825 his work as a botanist must have been recognized both in this country and abroad as in that year Professor DeCandolle, of Geneva, dedicated a genus of plants to Dr. Darlington. This, however, did not prove to be sufficiently distinct to maintain its place as an independent genus; subsequently (in 1854), Dr. Torrey, of New York, gave Dr. Darlington's name to a genus (*Darlingtonia*) of California plants of the family Sarraceniaceae or pitcher-plants. As Mr. Townsend, who wrote a sketch of Dr. Darlington soon after his death, says, this ''constitutes a worthy and fitting compliment to an industrious laborer in the agreeable fields of botanical science.''

In the ''Florula'' he gives a glossary of botanical terms and with each plant a note stating the derivation of its Latin name, its common name, a description of the plant, its uses in medicine and the arts, and often a statement as to its exact habitat, as ''near the forks of the Brandywine,'' ''on the farm of J. Parke,'' ''on the Serpentine Ridge,'' etc.

In 1837 he published the ''Flora Cestrica,'' an enlarged and extended edition of the ''Florula'' and which he called ''an attempt to enumerate and describe the flowering and filicoid plants of Chester County by Wm. Darlington, M.D., President of the Chester County Cabinet of Natural Science, Member of the American Philosophical Society, Correspondent of the Academy of Natural Sciences at Philadelphia, and of the Lyceum of Natural History at New York, etc., etc.'' He dedicated it to the ''Cultivators of Botanical Science in the County of Chester.''

The description of plants in the ''Flora'' is more elaborate than in the ''Florula.'' He apologizes for retaining the ''*Linnaean arrangement* when the modern botanical world has so generally abandoned it for the *Natural method,*'' but he says: ''I am fully conscious of the old-fashioned garb in which this work is arrayed, and have a thorough conviction of the value and importance of studying plants according to their natural affinities: But, observing that the Natural method is yet kept, as it were, in a continual state of fermentation, by the labors and researches of the great Masters in the Science,—and feeling my inability to co-operate, or aid in adjusting its details,—I thought it most advisable, in the present attempt, to adhere mainly to the Linnaean classification.''

In 1853, however, when he published the last edition of the ''Flora Cestrica,'' he says that ''the whole is arranged according to the Natural System as illustrated by DeCandolle, Hooker, and Gray.'' In the 1853 edition it was his intention to insert a ''brief description of all the indigenous species of the vegetable kingdom which had been found in our county. It soon became apparent that the lower orders, especially the fungi, were so multitudinous as well as obscure that it was concluded to omit all below the Lichens.''

The writer of this article does not feel competent to attempt an evaluation of the three editions of the ''Flora Cestrica'' as contributions to the science of botany. Moreover, the article is intended as a sketch of Dr. Darlington's life and not as an appraisal of his standing as a scientist. The writer is familiar, however, with the use that was made of these books amongst the intelligent citizens of Chester County and near-by. It stimulated an interest in botany that has not yet died out, and one or more copies were to be found in many farmers' homes. They were frequently referred to, to identify plants, noxious and otherwise, and have been a highly valuable, educating influence in this community.

That Dr. Darlington intended his work to be of general educational value and a part of his interest in the intellectual improvement of the people is shown by the fact that in 1847 he published the ''Agricultural Botany, an enumeration and description of the useful plants and weeds which merit the notice or require the attention of the American Agriculturist.'' He dedicates to ''the Young Farmers of the United States this humble attempt to aid and persuade them to cultivate a department of science essential to an enlightened agriculture and indispensible to an accomplished yeomanry.'' In a preparatory note he says: ''I address myself to the youthful and aspiring Agriculturists of our country, who seek to elevate their noble Profession to its just rank among human pursuits—and who feel that the exercise of intellect, as well as of muscle, is indispensible to the accomplishment of their purpose.''

He insists on the use of technical botanical terms and says: ''By employing names, and phrases, which have an exclusive application, and a definite meaning, the study of plants is really simplified; and the knowledge acquired, being thereby communicable with more readiness and precision, is greatly enhanced in practical value.'' We wonder what the average farmer would understand by a ''semi-baccate, indehiscent carpel.''

The ''Agricultural Botany'' never achieved the popularity of the ''Flora.''

In 1843, as a result of a suggestion made by Dr. Asa Gray while on a visit to Dr. Darlington in West Chester, he published the ''Reliquiae Baldwinianae'' and dedicated it to Dr. Gray. Dr. William Baldwin, a native of Chester County and also in youth a Friend, had been a fellow student with Dr. Darlington at the Medical School of the University of Pennsylvania in 1802, and a close intimacy developed between them. They had grown up under similar conditions and their tastes were congenial, both being physicians and both botanists. In a letter to Mrs. Baldwin shortly after the premature death of her husband in 1819, Dr. Darlington says: ''I have never yet had the happiness to be acquainted with any man of a more amiable and upright character, more faithful in the discharge of his duties, or more zealously devoted to the interests of science or the welfare of his fellow creatures.'' Both from the testimony of his friend and from the character of his letters we know that Dr. Baldwin was a zealous botanist and a kindly and lovable man. He was a surgeon in the United States Navy for most of his professional life, and was stationed for some years on the coast of Georgia where in the intervals of his work he explored the country and made collections of the plants; thence he wrote letters to his botanical friends in the North which contain, beside accounts of the plants seen, interesting observations on the southern Indians and on many other subjects. He never had robust health, and died while on the way to act as botanist to the expedition of Major Long to the Rocky Mountains. Most of the little volume is made up of letters to or from the venerable botanist of Lancaster, Pennsylvania, Rev. Henry Muhlenberg, or else of letters to Dr. Darlington himself.

In 1849 Dr. Darlington published the ''Memorials of Bartram and Marshall.'' The memorial of Bartram he dedicated: "To the true lovers of Botany, on either side of the Atlantic, these Memorials of the men who, through perils and privations, so early and so faithfully explored the vegetable treasures of this Continent." And that of Humphry Marshall he dedicated: "To the Chester County Cabinet of Natural Sciences these reminiscences of the venerable man, whose scientific labours and attainments reflect honour upon our County, and whose noble example it should be our ceaseless endeavor to emulate." Very little of these "Memorials" was written by Dr. Darlington, only sketches of the authors of various letters. The letters are of great interest, many being written by or addressed to men of renown in their respective fields of labor. Among them were Peter Collinson, Dr. John Fothergill, Dr. John Coakley Lettson, and Sir Hans Sloane of London; Dr. J. J. Dillenius of the University of Oxford; Gronovius, the Dutch physician and botanist who wrote the first flora of Virginia; Linnaeus, the great Swedish botanist, and his pupil, Peter Kalm, who traveled in North America; Colonel William Byrd and Isham Randolph of Virginia; Dr. Benjamin Franklin, Dr. Thomas Parke, Dr. Caspar Wistar, and Dr. Thomas Bond of Philadelphia; John Dickinson, the author of the famous "Farmer's Letters"; Sir Joseph Banks, president of the Royal Society of London; Rev. Henry Muhlenberg of Lancaster, and many others. Probably no other American scientists have had more distinguished correspondents than these humble Quaker farmers. Nothing that Dr. Darlington ever edited or published has had as much interest to the general public as these "Memorials," for, beside discussion of botanical subjects, they contain many comments on persons and events of the time.

There is little humor in Dr. Darlington's writings. He was almost never consciously humorous, though Mr. Townsend says he could entertain a room with his wit and humor. However, we are impressed by the quaintness of his style, and by the frequent literary allusions and quotations.

The last literary production of the Doctor was his "Notae Cestrienses," being an account of noted men of Chester

County and their work. These notes were written in collaboration with his friend, J. Smith Futhey, and were published in a local newspaper. So far as appears they were never issued in book form.

In recognition of Dr. Darlington's scientific work Yale College conferred upon him the degree of LL.D., and he was a member of more than forty literary and scientific societies in this country and abroad. He carried on a correspondence with scientists in many countries, which his wide knowledge usually enabled him to do in their own languages.

In his later years he took pupils in botany as he had in his earlier life taken pupils in medicine. He regarded this as a part of his work in popular education. His pupils had for him not only great respect but, as one of them has told the writer, they felt for their master a peculiarly affectionate regard.

Dr. Darlington died after a paralytic attack April 23, 1863, aged eighty-one years. About twenty years before his death he wrote the epitaph which is inscribed on the stone at the head of his grave in Oakland Cemetery near West Chester. This grave is cared for by a committee of the Chester County Medical Society which sees to it that his modest wish is fulfilled:

"PLANTAE CESTRIENSES
QUAS
DILEXIT ATQUE ILLUSTRAVIT
SUPER TUMULUM EJUS
SEMPER FLOREANT."

The Eastern Long-styled Phloxes, part 2[1]

EDGAR T. WHERRY

12. **Phlox glaberrima** Linné. SMOOTH PHLOX. Plate 2.

History.—The earliest known reference to this *Phlox* was that published by Plukenet[2] in 1705, his description being "Lychnidea Asclepiadis folio *Floridana,* summo caule floribunda." It was first figured by Dillenius,[3] with the characterization "Lychnidea folio melampyri." In establishing the genus *Phlox* in 1737, Linné[4] evidently had this species primarily in mind, for it is the only one he listed in the catalog of the plants in Clifford's garden.[5] Where these cultivated plants came from is unknown, but it may well have been eastern Virginia, Gronovius[6] having recorded a "Phlox foliis lineari-lanceolatis" there in 1739. The name *Phlox glaberrima* was applied to it by Linné[7] in the Species Plantarum, and has been used by practically all subsequent writers, although Salisbury[8] preferred *P. melampyrifolia.*

As already pointed out under *P. carolina,* that species has been combined with the present one by many botanists, certain forms of it being indeed classed by Gray[9] as *P. glaberrima* var. *suffruticosa.* The reinstatement of *P. carolina,* however, calls for a transfer of this variety to it. Finally, in his monograph of the Polemoniaceae, Brand[10] described as *P. glaberrima* subvar. *angustissima* a small-leaved variant from the Gulf Coastal Plain.

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[1] Contribution from the Botanical Laboratory of the University of Pennsylvania. Part 1 appeared in Bartonia 13: 18. 1932.

[2] Amaltheum Botanicum 136. 1705.

[3] Hortus Elthamensis 1: 203, pl. 166, f. 202. 1732.

[4] Genera Plantarum 52. 1737.

[5] Hortus Cliffortianus 63. 1737.

[6] Flora Virginica 21. 1739.

[7] Species Plantarum (1): 152. 1753.

[8] Prodromus Stirpium 123. 1796.

[9] Syn. Flora N. A. 2, pt. 1: 130. 1878.

[10] In Engler's Pflanzenreich IV. 250: 64–65. 1907.

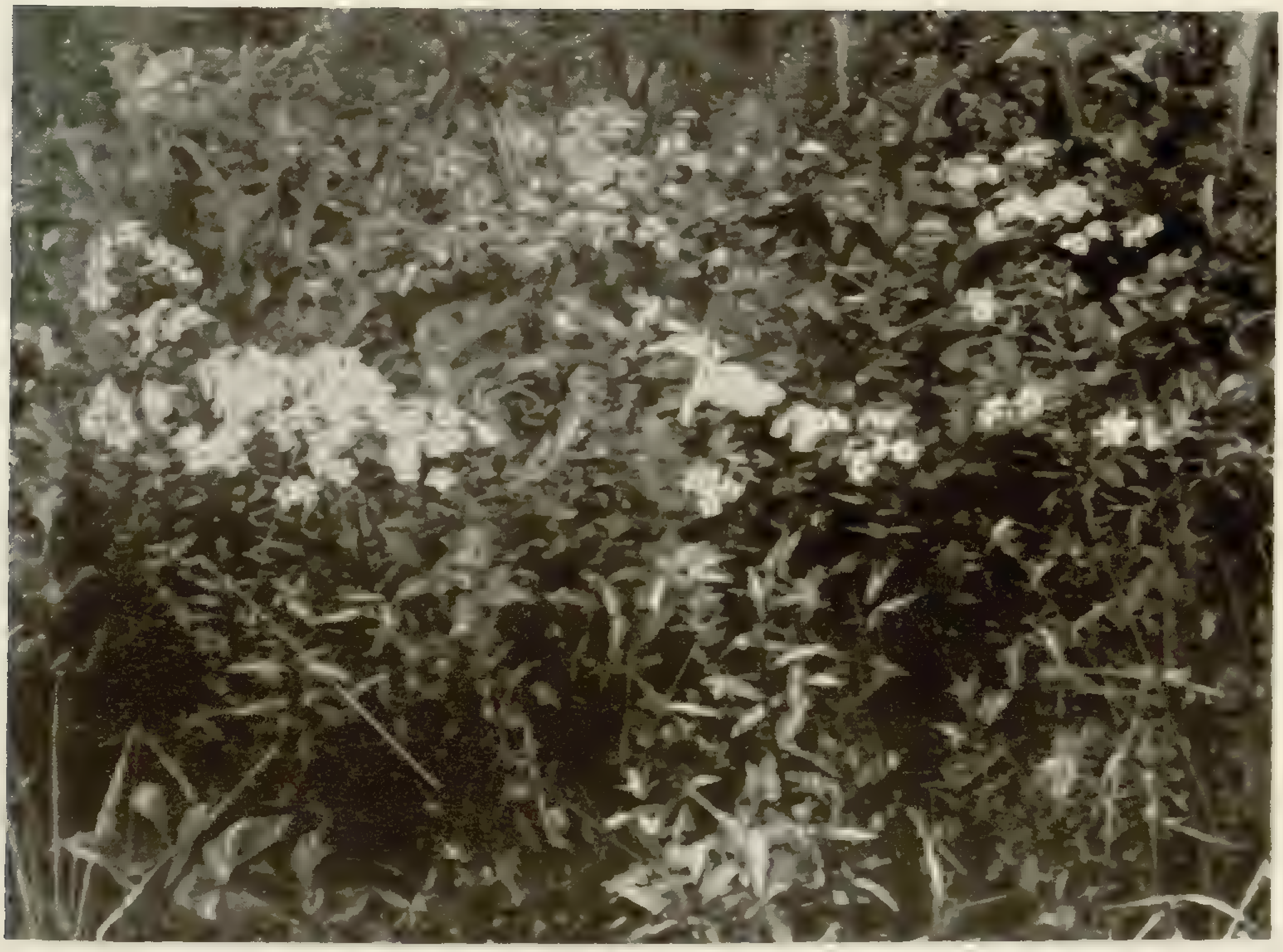

FIG. 1. *Phlox glaberrima melampyrifolia.*
Northeast of Williston, Barnwell County, South Carolina.

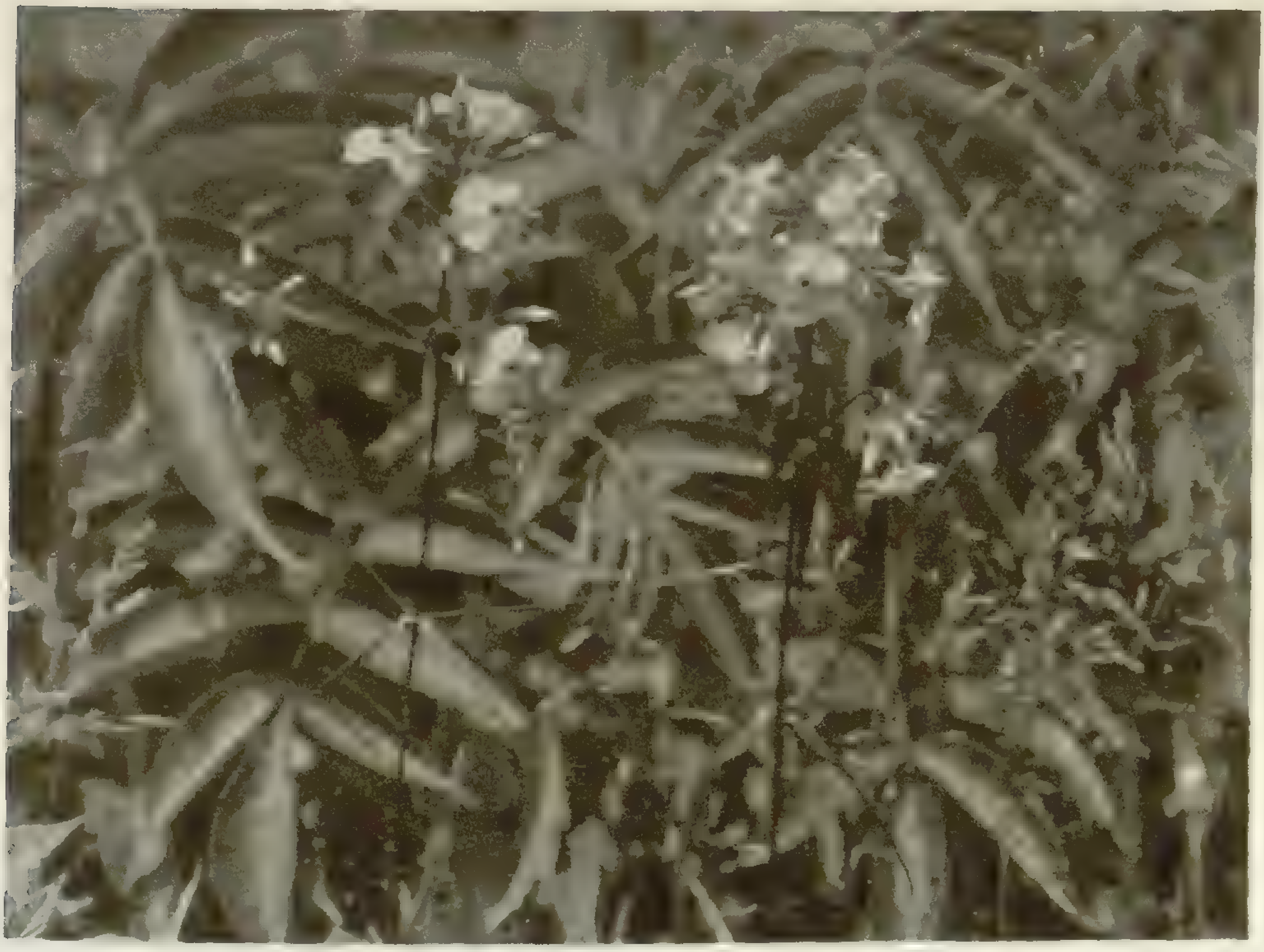

FIG. 2. *Phlox glaberrima interior.*
West of Wheatland, Knox County, Indiana.

Geography.—The range of this species is decidedly different from that of the relative with which it has so often been confused: while *P. carolina* is essentially an upland plant, *P. glaberrima* occurs chiefly in the lowlands, the ranges of the two overlapping only in the vicinity of longitude 85° west. As brought out in figure 1, the second-named species extends from northern Florida to southeastern Virginia and to eastern Texas, and thence northward to southeastern Wisconsin and northern Ohio. One of its varieties occurs only above the Fall-line (cross-hatched band), the other chiefly below this line, though locally entering adjacent provinces.

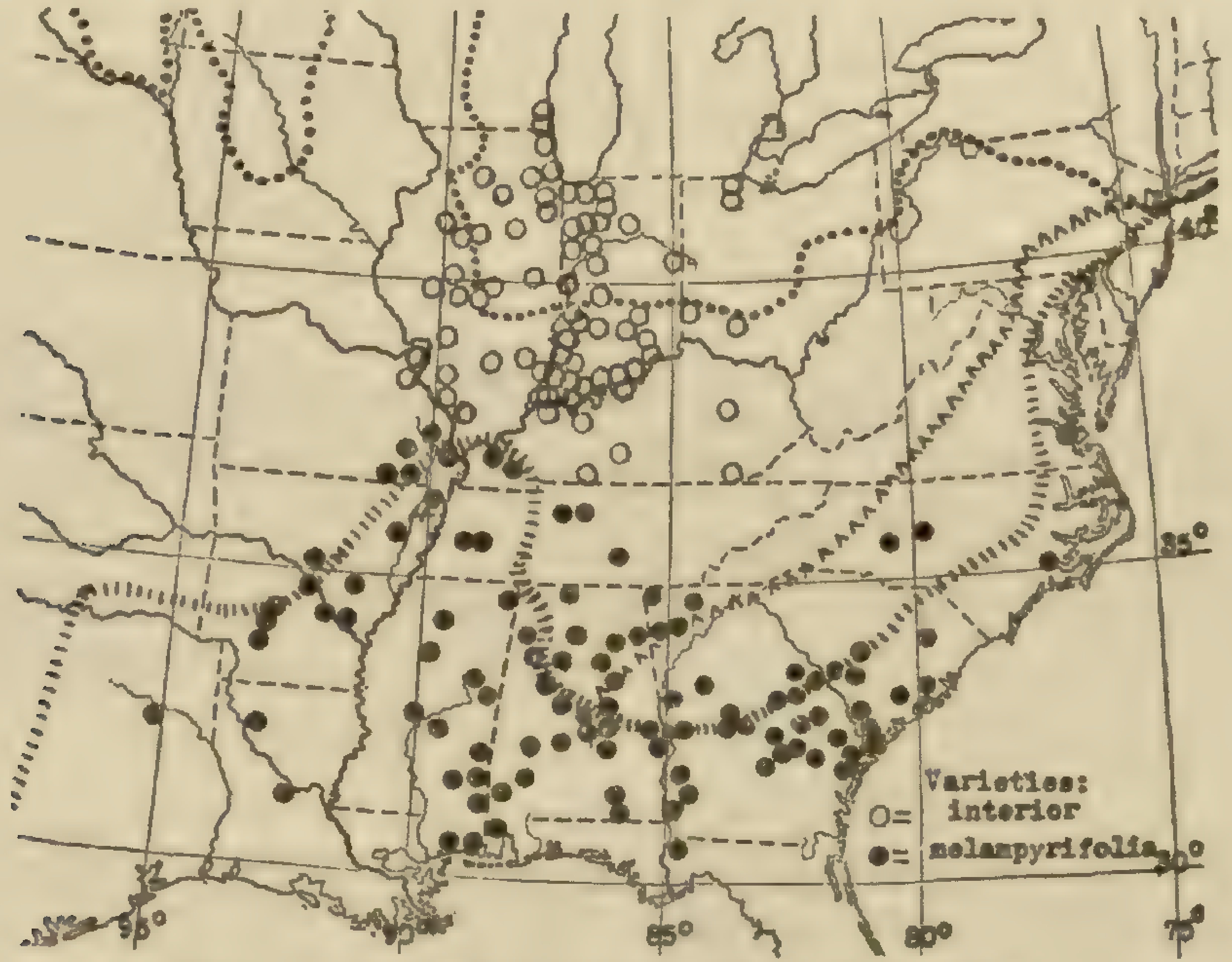

Fig. 1. Distribution of *Phlox glaberrima.*

Alabama: Occurs practically throughout, the county list being: Autauga, Bibb, Cherokee′, Chilton′, Clarke′, Coffee′, Coosa′, Cullman, Dallas, Elmore, Etowah′, Fayette′, Geneva′, Lee, Limestone′, Marengo′, Marion′, Mobile, Montgomery, Russell′, St. Clair, Talladega′, Tuscaloosa′, Walker′, and Washington′.

Arkansas: Occasional southward and eastward, specimens being preserved from Arkansas, Clark, Craighead, Faulkner, Hot Spring, Jefferson, Nevada, Prairie, and Pulaski counties.

Florida: Known from several places in Gadsden′ County.

Georgia: Frequent, except toward the northeast and southeast corners, the county list being: Bartow′, Bibb′, Bryan, Bulloch, Calhoun′, Dade, Early′, Emanuel′, Floyd, Gilmer′, Jefferson′, Jenkins′, Laurens′, Liberty, McDuffie, Montgomery′, Muscogee, Peach, Randolph′, Richmond, Spalding, Tattnall′, Telfair′, Troup′, Twiggs′, Washington′, and Wheeler′.

Illinois: The northern variety occurs practically throughout, specimens having been seen from 24 counties: Cass, Champaign, Christian, Cook, Du Page, Jackson, Kankakee, Knox, Lake, La Salle, Lee, Livingston, Macon, Macoupin, Marion′, Menard, Peoria, Randolph, Richland, St. Clair, Sangamon, Wabash, Will, and Woodford.

Indiana: Known from even more counties than in the next-preceding state, chiefly owing to the collecting activity of Mr. Charles C. Deam: Bartholomew, Benton, Clark, Clay, Crawford, Daviess, Dubois, Fulton, Gibson, Harrison, Jasper, Jay, Jefferson, Jennings, Knox′, Lake, Laporte, Newton, Owen, Porter, Posey, Pulaski, Putnam, Shelby, Spencer, Starke, Sullivan, Tippecanoe, Vanderburg, Vermilion, Vigo, Warrick, Washington, and White.

[Iowa: Included by W. Greene,[1] apparently by mistake.]

Kentucky: As little collecting has been done, only 8 county records exist: Bell, Daviess, Edmonson, Henderson, Logan, McCracken, Marshall, and Powell.

Louisiana: Rare, specimens having been seen only from Bienville and Rapides parishes.

[Minnesota: Reported by MacMillan[2] from "Forest district to New Ulm," but Prof. C. O. Rosendahl advises me that there are no specimens in the State University herbarium, glabrate forms of *P. pilosa* having perhaps been taken for it.]

Mississippi: Fairly common, the county list being: Clarke, Greene′, Grenada, Harrison, Jackson, Jones, Lafayette, Madison, Noxubee, Oktibbeha, Scott, Tishomingo, and Wayne′. Subvar. *angustissima* Brand[3] was from Biloxi, which is in Harrison County in this state, and not Missouri, as given.

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[1] Plants of Iowa 206. 1907.

[2] Metaspermae Minn. Valley 432. 1892.

[3] In Engler's Pflanzenreich IV. 250: 65. 1907.

MISSOURI: Common southeastward, in the counties: Bollinger, Butler, Dunklin, Jefferson, Ripley, St. Louis, Scott, and Wayne; reports further west are unconfirmed.

NORTH CAROLINA: Apparently rare, specimens being in the herbaria studied only from Craven, Randolph, and Rowan counties. Records from the Blue Ridge represent *P. carolina* instead.

OHIO: Occasional toward the west side, in Butler, Highland, Lucas, and Wood counties; elsewhere other species have been mistaken for it.

SOUTH CAROLINA: Frequent southward, the county list being: Aiken′, Barnwell′, Beaufort′, Berkeley, Charleston, Dorchester, Florence′, Hampton, Jasper, and Lexington′.

TENNESSEE: Owing to lack of collecting, specimens are preserved only from Coffee, Davidson, Dickson, Haywood, and Madison counties.

TEXAS: A vigorous form has been collected at two localities in Smith County.

VIRGINIA: In proposing the name *P. glaberrima,* Linné referred to Gronovius's record of a Clayton plant, and as the latter collected chiefly in Gloucester County, Virginia, the species may be presumed to have formerly grown there. It is not known to have been found in subsequent times, however, having probably been exterminated by agriculture.

WISCONSIN: Limited to the southeast corner, there being records for Kenosha and Racine counties only.

Ecology.—While both varieties of *Phlox glaberrima* grow in rather moist places, the northern one is usually found in circumneutral soil in grassy meadows, the southern in decidedly acid soils in a variety of habitats, including pinelands, pitcher-plant meadows, thickets along brooks, and even rich woods on river flood-plains. In all cases the associations appear to be climax or subclimax ones for the areas. The blooming period begins in late Spring and extends to mid-Summer or occasionally to early Autumn. Insect visitors observed by Robertson[1] comprised 7 butterflies and one fly.

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[1] Ecology 8: 119. 1927; Flowers and Insects 151. 1928.

Variation.—*Phlox glaberrima* is a markedly variable species, especially in habit and foliage characters. Differences in the availability of moisture or of nutrient elements, as well as inherited tendencies, have been observed to lead to a range in height from (25–) 50 to 100 (–175) cm. The leaf-outline is normally linear to lanceolate or oblong-lanceolate, and only exceptionally approaches the elliptic shape so frequent in *P. carolina*; the larger leaves are from (35–) 50 to 150 (–200) mm. long, and (3–) 5 to 15 (–25) mm. wide. Although as the name implies the plants are sometimes wholly glabrous, a certain amount of pubescence is often present. Most frequently this appears on the inner surface of the sepals and on the pedicels, but it may extend down over the bracts, stems, and even the leaves. This tendency seems to reach its maximum along the Gulf coast, in the very region where *P. pilosa* shows diminished pubescence.

In the key to the species of section *Ovatae* in the preceding article in this series, the limits of calyx-length for *P. glaberrima* were stated, in round numbers, as "6 to 8 mm." Actually the limits are slightly wider than this when extremes are taken into account, and two geographic varieties are recognizable on the basis of length and extent of union of the sepals. In the southern one these range from 6.5 to 8 (–8.5) mm. long, and are united to about half their length; in the northern, from (5.5–) 6 to 7.5 mm., with the union extending well beyond the middle.[1]

The corolla-color is usually phlox-purple, with occasional gradation toward a slightly bluer or redder hue. Pallid and albino mutants appear in small numbers in most large colonies. The pigment may be uniformly distributed over the corolla-face, or may diminish toward the center, forming a pale eye bearing a more or less distinct five-rayed star of deeper shade. In dimensions the corolla varies moderately: the tube-length from (16–) 18 to 23 (–25) mm., the lobes from about 7 × 5 to 10 × 9 mm. The styles range from (11–) 15 to 20 (–22) mm. in length, occasionally becoming exserted.

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[1] The measurements given have been made on dried specimens, in which some shrinkage often occurs, so that fresh material may yield slightly greater values.

VARIETIES AND FORMS OF PHLOX GLABERRIMA

SEPALS 5.5–7.5 MM. LONG, UNITED TO ABOUT ⅔ THEIR LENGTH; CALYX-LOBES THUS 1.5–3 MM. LONG.

Phlox glaberrima interior Wherry, var. nov. Sepala 5.5 ad 7.5 mm. longa, circa ⅔ longitudine conjuncta. Named from the region of its occurrence. Typified by specimen from 2 miles west of Wheatland, Knox Co., Ind., collected by E. T. W. June 5, 1931. Ranges from Ky. to E. Mo., SE. Wisc., and N. Ohio.

Forms:

Maculate-stemmed. Typified by specimen from 7 miles southwest of Boonville, Warrick Co., Ind., collected by C. C. Deam June 5, 1930, in herbarium of E. T. W. Occasional throughout.

Pubescent-pedicelled. Typified by specimen in U. S. National Herbarium from Jackson Co., Ill., collected by G. H. French July 17, 1873. Rare.

Light-colored (pink, white, etc.) Typified by specimen in Field Museum herbarium from Ravenswood, Cook Co., Ill., collected by R. N. Lloyd Aug. 15, 1887. Infrequent.

SEPALS 6.5–8.5 MM. LONG, UNITED TO ½–⅔ THEIR LENGTH; CALYX-LOBES THUS 2.5–4 MM. LONG.

Phlox glaberrima melampyrifolia (Salisbury) Wherry, status novus. *P. glaberrima* Linné. *P. melampyrifolia* Salisbury. Ranges from NW. Fla. to E. Tex., SW. Mo., and SE. Va., at low elevations.

Forms:

Small-leaved. *P. g.* subvar. *angustissima* Brand. Common in sterile situations, such as pitcher-plant meadows.

Maculate-stemmed. Typified by specimen from 4½ miles north of Samantha, Tuscaloosa Co., Ala., collected by E. T. W. May 8, 1929. Frequent.

Pubescent. Typified by specimen from 2½ miles west of Jackson, Clarke Co., Ala., collected by E. T. W. July 12, 1932. Most often observed in Ala. and Miss., but may occur elsewhere.

Light-colored (pink, white, etc.) Typified by specimen from 2 miles northwest of Pletcher, Chilton Co., Ala., collected by E. T. W. July 14, 1932. Rather rare.

Cultivation.—As noted under History, the early records of this *Phlox* referred to cultivated material, which was probably sent to Europe from eastern Virginia. When transplanted from the wild into rich garden soil its leaves become larger and its inflorescence more massive, as shown in the plates published, for example, by St. Hilaire,[1] Vietz,[2] and Sweet.[3] It does not become so attractive, however, as does *P. carolina* ("P. suffruticosa"), and is today rarely seen in gardens.

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[1] Plantes France 3: pl. (91). 1809.

[2] Abbildung med.-ökon.-techn. Gewächse 8: pl. 719. 1818.

[3] British Flower Garden (2) 1: pl. 36. 1830.

13. **Phlox maculata** Linné. MEADOW PHLOX. Plate 3.

History.—Several pre-Linnean references to this species are known. Plukenet[1] listed it in 1700 as "Lychnidea *Mariana* elatior, Alsines aquaticae foliis, floribus in longam spicam densè stipatis," and published a crude but unmistakable figure of it five years later.[2] It was termed by Ray[3] "Lychnoides *Marilandica* Jasmini flore quinquepartito, foliis binis oppositis, basi & auriculis caulem utrinque amplexantibus." In the correspondence between Bartram and Collinson, published by Darlington,[4] two references to it occur—Collinson to Bartram, June 16, 1742: ". . . but I have a *Lychnis,* from Doctor WITT, different from any yet that I have seen. It seems to be the king of that tribe. . . . It is now about two feet high, and yet no flowers appear. The stalk is most finely spotted,—which is very distinguishing from all the rest that I have seen."—Bartram to Collinson, June 11, 1743: "The Doctor's famous *Lychnis,* which thee has dignified so highly, is, I think, unworthy of that character. Our swamps and low grounds are full of them. I had so contemptible an opinion of it, as not to think it worth sending . . ." In the account of his travels in North America, Kalm[5] recorded finding it in New Jersey on June 2, 1749, and according to Juel and Harshberger,[6] a specimen is preserved in his herbarium at Upsala. Finally, it was included in the 1752 edition of Miller's Gardeners' Dictionary,[7] as Phlox No. 4.

In assigning the species name, Linné[8] noted that he had received the plant from Kalm, but stated its source as Virginia. As a photograph[9] of his specimen shows it to represent a variety common only north of that state, and as Kalm did not travel to any extent south of New Jersey, the latter should be regarded as its type locality.

[1] Mantissa 122. 1700.
[2] Amaltheum Botanicum pl. 425, fig. 6. 1705.
[3] Supplementum 489. 1704.
[4] Memorials of Bartram and Marshall 156, 164. 1849.
[5] Travels into North America 2: 222. 1771.
[6] Proc. Acad. Nat. Sci. Phila. 81: 303. 1929.
[7] Gardener's Dictionary, ed. 6. page PH. 1752.
[8] Species Plantarum (1): 152. 1753.
[9] Which I owe to the kindness of Dr. Wm. R. Maxon.

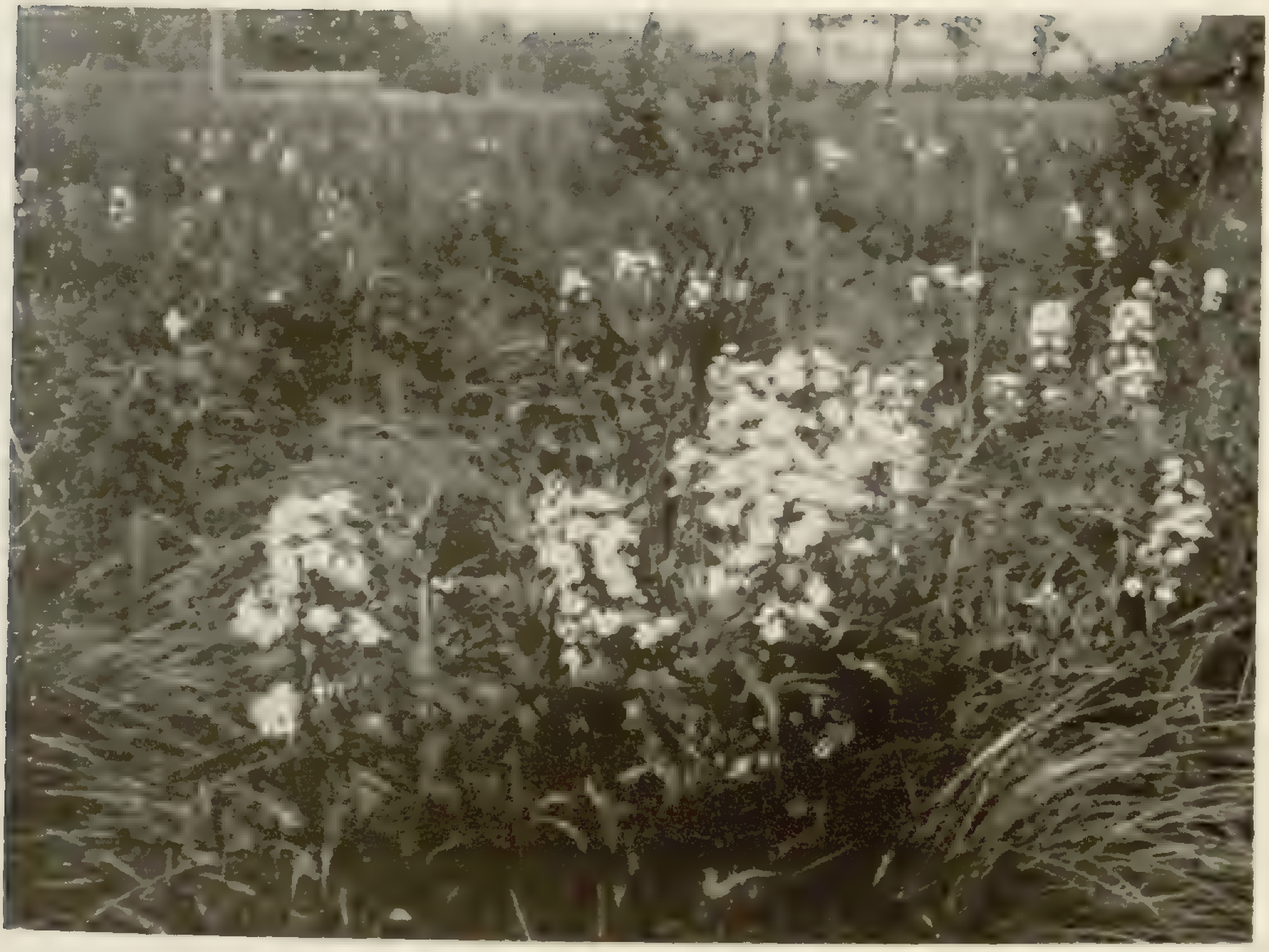

FIG. 1. *Phlox maculata odorata.*
Southeast of Marlton, Burlington County, New Jersey.

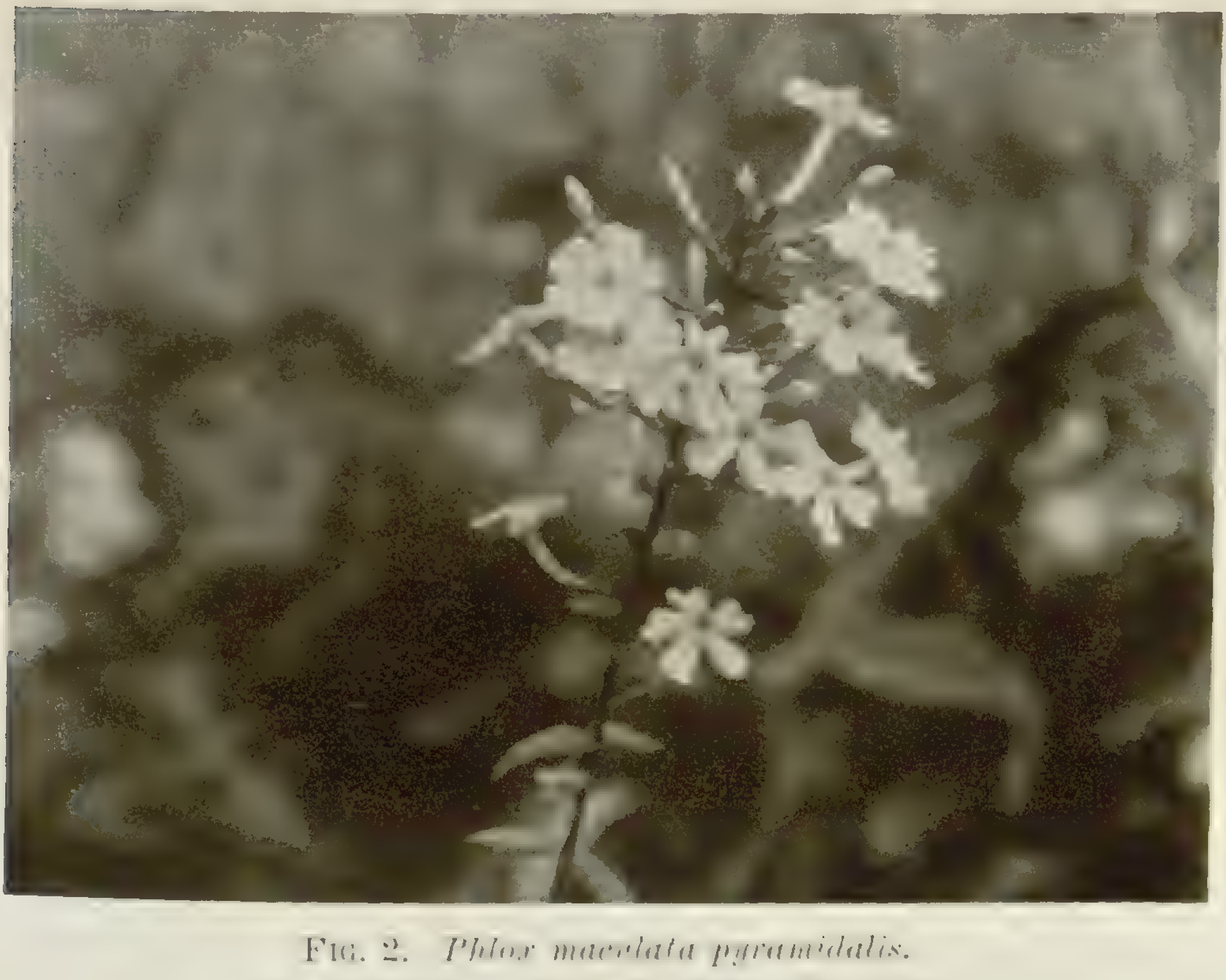

FIG. 2. *Phlox maculata pyramidalis.*
In cultivation; originally from Maryland.

Plants which appear to represent varieties or forms of the species, with purple corollas, successively received the names *P. maculata* var. *α purpurea* Michaux,[1] *P. pyramidalis* Smith,[2] *P. odorata* Sweet,[3] and *P. reflexa* Sweet.[4] Albino forms, with the stem scarcely if at all maculate, such as occasionally occur in many of its colonies, have been assigned a still larger number of names, including *P. suaveolens* Aiton,[5] *P. alba* Moench,[6] *P. maculata* var. β *candida* Michaux,[7] *P. tardiflora* Penny,[8] *P. longiflora* Sweet,[9] *P. omniflora* Loudon,[10] and *P. maculata* var. *suaveolens* (Aiton) Brand.[11] Several additional names in the literature probably apply to this species, but the descriptions accompanying them are too incomplete for certain identification, and type specimens are lacking.

Geography.—On the map (Fig. 2) which appears on the following page, the range of *Phlox maculata* is indicated as fully as available information will permit. Although it has been reported at one time or another from nearly all the southern states, no specimens certainly referable to it have been seen from south of latitude 35°, and *P. carolina* or *P. glaberrima*, both of which at times have maculate stems, appear to have been mistaken for it. Unlike the next-preceding species, its distribution shows no evident relation to any geological or topographic boundaries. The range as a whole extends from central North Carolina to eastern Missouri, southeastern Minnesota, and southern Quebec, with garden escapes eastward into New England. It thus shows the least tendency to push southward of all the eastern species.

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[1] Flora Boreali-Americana 1: 143. 1803.
[2] Exotic Botany 2: 55, pl. 87. 1806.
[3] British Flower Garden 3: pl. 224. 1827.
[4] British Flower Garden 3: pl. 232. 1827.
[5] Hortus Kewensis 1: 206. 1789.
[6] Supplementum Plantarum 173. 1802.
[7] Flora Boreali-Americana 1: 143. 1803.
[8] Hortus Epsomensis 38. 1828.
[9] British Flower Garden 4: pl. 31. 1830.
[10] Hortus Brittanicus, Suppl. 2: 656. 1839.
[11] In Engler's Pflanzenreich IV. 250: 60. 1907.

[Alabama: Mohr[1] recorded this species from four counties, and also stated it to be "abundant on the Warrior tableland," but his specimens, preserved in the U. S. National Herbarium, all represent *P. carolina.*]

[Arkansas: Included by Branner and Coville[2] in their list, but no specimens are present in the herbaria seen.]

Connecticut: Known in two counties, Fairfield, where it may be native, and New London[a], where it has escaped.

Delaware: Common in New Castle[f] County.

District of Columbia[f]: Both varieties once occurred here.

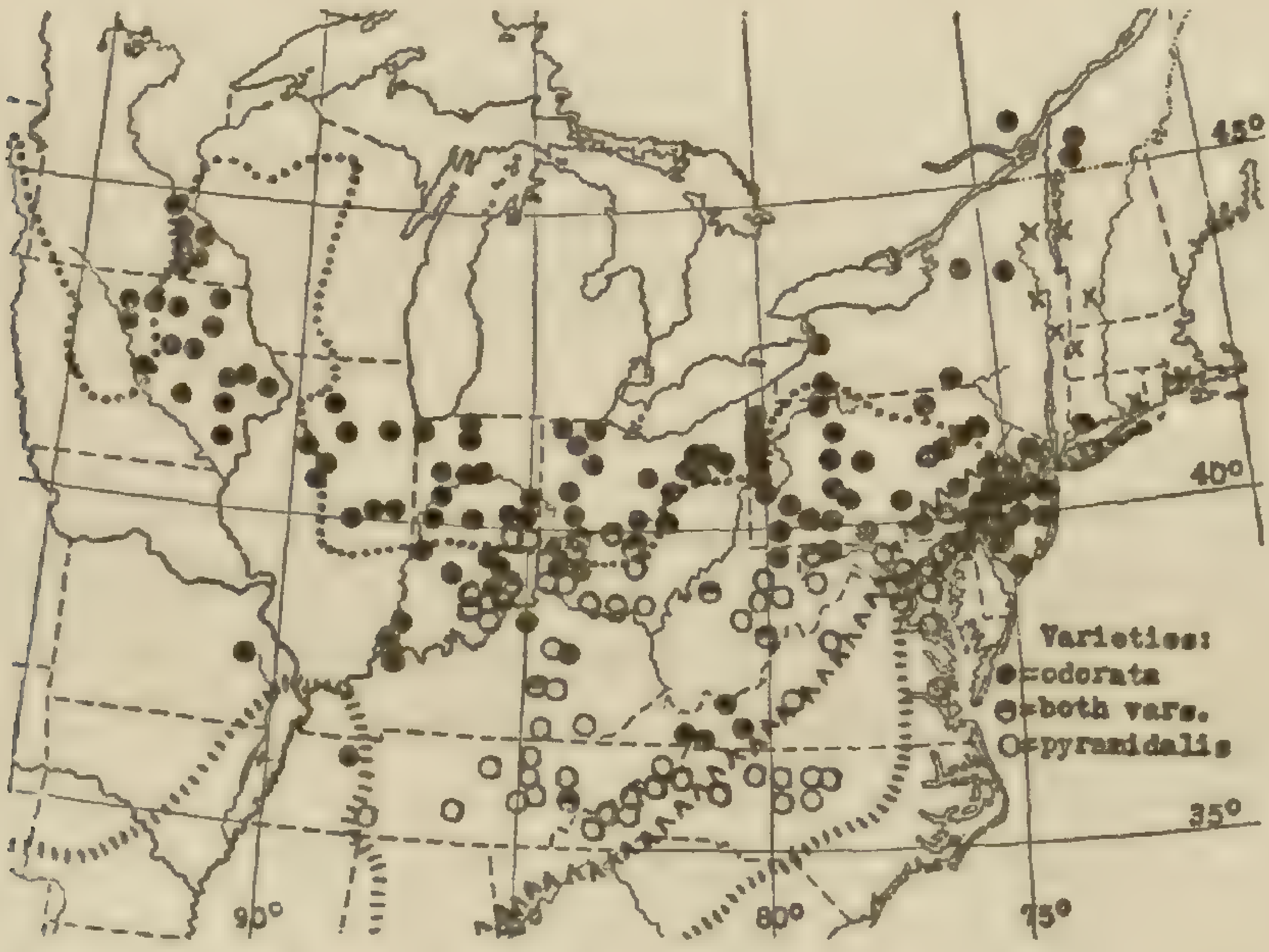

Fig. 2. Distribution of *Phlox maculata.*

Illinois: Apparently rather rare, the county list being small: Champaign, La Salle, Lee, Piatt, Stark, Tazewell, Vermilion, Will, and Woodford.

Indiana: Recorded from 28 counties, although Mr. Charles C. Deam advises me that he does not consider it as really common: Cass, Clark, Decatur, Delaware, Fayette, Gibson, Hamilton, Henry, Jackson, Jay, Jefferson, Jennings, Lake, Marshall, Miami, Monroe, Montgomery, Posey, Randolph, Ripley, St. Joseph, Scott, Shelby, Tippecanoe, Vigo, Washington, Wayne, and White.

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[1] Plant Life of Ala. 685. 1901.

[2] Ann. Rept. Geol. Survey Ark. 1888: 204. 1891.

Iowa: Frequent in the eastern part, specimens or records having been seen from the counties: Black Hawk, Cerro Gordo, Clinton, Fayette, Floyd, Grundy, Hancock, Henry, Johnson, Jones, Linn, Poweshiek, Story, Winneshiek, and Wright.

Kentucky: Both northern and southern varieties are known here, the latter being represented by an unusually narrow-leaved form. Specimens are preserved from 8 counties: Bell, Clark, Fayette, Henderson, Lincoln^{f}, McCreary^{f}, Owen, and Rockcastle, although it probably occurs in many others also.

Maryland: Common in the central and western portions, the two varieties intermingling; the county list is: Allegany, Baltimore, Cecil^{f}, Frederick, Garrett, Harford^{f}, Howard, Montgomery^{f}, Prince Georges^{f}, and St. Marys^{f}.

[Massachusetts: Escaped from cultivation in Berkshire^{e} and Bristol^{e} counties.]

Minnesota: Extends into the southeastern counties, herbaria containing specimens from Dakota, Dodge, Goodhue, Mower, Olmsted, and Wabasha.

[Mississippi: Three records published by Lowe[1] are believed to represent maculate-stemmed forms of *P. glaberrima*.]

Missouri: Though sometimes stated to be common in this state, the species must actually be very rare there, as the only specimens seen in all the herbaria examined are from Iron County.

New Jersey: The northern variety is abundant throughout, except in the pine-barrens, there being 11 county records: Burlington^{f}, Camden, Cape May^{f}, Gloucester, Hunterdon, Mercer, Middlesex, Monmouth, Ocean, Passaic, and Salem. The material on which the species was founded had been collected here by Kalm.

New York: Rather rare, only 8 counties being represented by specimens, and some of these are considered by House[2] as escapes: Broome, Cattaraugus, Erie, Essex^{e}, Hamilton, Lewis, Rensselaer^{e}, and Saratoga^{e}.

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[1] Plants of Miss. 233. 1921.

[2] Ann. List Ferns & Flg. Plts. N. Y. St. 580. 1924.

NORTH CAROLINA: Although many reports of this species here really represent *P. carolina,* the southern *P. maculata* does occur in at least 13 counties: Avery, Buncombe, Chatham, Durham′, Forsyth, Guilford, Haywood, Iredell, Jackson′, Madison, Orange, Randolph, and Yancey′.

OHIO: The northern variety is common and the southern occasional, in the counties: Adams, Auglaize, Champaign, Clark, Clermont, Clinton, Fairfield, Franklin′, Fulton, Gallia, Greene, Hamilton, Hancock, Henry, Hocking, Holmes, Licking, Lucas, Madison, Mahoning, Montgomery, Muskingum, Portage, Richland, Scioto, Stark, Summit, Warren, and Wayne.

PENNSYLVANIA: The county list is even larger than that for Ohio: Allegheny, Beaver, Bedford, Berks′, Blair, Bradford, Bucks′, Butler, Cameron, Center′, Chester′, Clearfield, Columbia, Crawford, Cumberland, Delaware′, Fayette, Franklin, Huntingdon, Lackawanna, Lancaster′, Lawrence, Lehigh, Luzerne, McKean, Mercer, Montgomery, Montour, Northampton, Philadelphia, Somerset, Westmoreland′, and York′. The southern variety enters Lancaster County.

[SOUTH CAROLINA: Specimens from this state labelled *P. maculata* have proved to be *P. carolina* instead.]

TENNESSEE: Both the northern and a narrow-leaved form of the southern variety occur here, although there are only 11 county records: Benton, Blount, Carter, Coffee, Knox, Morgan′, Putnam, Rhea′, Roane, Scott′, and Wayne.

[VERMONT: Escaped in Addison^{s} and Windham^{s} counties.]

VIRGINIA: Scattered throughout, specimens being preserved from 9 counties: Albemarle, Arlington′, Bedford, Fairfax′, Floyd′, Giles, Grayson′, James City, and Smyth. Both varieties are well represented.

WEST VIRGINIA: Frequent, especially northward, in Barbour′, Hardy, Pocahontas′, Preston, Randolph′, Upshur, Webster, and Wirt counties. Unexpectedly, the southern variety appears to be the commoner.

CANADA. QUEBEC: Extends along the St. Lawrence valley into Brome-Missisquoi, Shefford, and Terrebonne counties. Perhaps in part an escape.

Ecology.—*Phlox maculata* is typically a wet-soil plant, growing in meadows, springy places, and alluvial flats along streams. Locally it may adapt itself to habitats which are moist in Spring but dry out later in the year, then tending to become stunted and bronzed. It prefers moderately acid soil reaction, but occasionally enters both alkaline and mediacid bogs. From the succession standpoint, its associations usually represent the climax for the area, although if forests invade the moist situations, it tends to die out. The northern variety begins to bloom in late Spring, and continues to the middle of Summer; the southern one starts 3 to 6 weeks later, and remains in bloom correspondingly longer. The bright purple, long-tubed, and often decidedly fragrant flowers attract various kinds of butterflies.

Variation.—This species varies greatly in stature, the northern variety ranging from 30 to 90, or rarely to 125 cm., the southern one (40–) 75 to 150 cm. in height. The stem is usually strongly spotted with purple, but sometimes, especially in pale-flowered individuals, is wholly green. Short stiff hairs often cover the stem and inflorescence-branches, but rarely spread over leaf-surfaces. In the northern variety there are from 7 to 15 or exceptionally 20 nodes; the leaves at the lower ones are linear, but rapidly broaden upward, often becoming ovate with cordate base just below the inflorescence. In the southern one the nodes are more numerous and usually more crowded, from 15 to 30 in number, and the leaves widen upward more gradually. In Kentucky and Tennessee even the uppermost leaves are linear-lanceolate, with tapering base, although elsewhere they tend to become oblong-lanceolate, with truncate or subcordate bases.

While a cylindrical panicle is characteristic, this varies in length from but 3 to over 30 cm., and branches may develop at the base of the inflorescence, which then takes on a narrowly conical shape. In contrast to its relatives, the calyx shows marked uniformity throughout the range, the sepals averaging 7 mm. long and being united to about ⅔ their length, and rarely deviating as much as a millimeter from these measurements.

Phlox-purple is the predominating corolla-color, but lighter hues and albinos are occasional. The eye tends to be paler and to bear a more or less distinct purple stripe at the base of each lobe. The tube ranges from 17 to 26 mm. in length, and the lobes from 6 to 11 mm. in both length and width. The styles usually terminate in the midst of the anthers, just below the tube-orifice, but may extend beyond the latter.

As noted under History, Michaux proposed two "varieties" of *P. maculata,* but since he was referring only to color-forms, his names are not here adopted. The first name applied to what is now considered a variety was *P. pyramidalis* of Smith, which is shown by his description to have represented the southern one. Sweet's *P. odorata* seems to be the especially sweet-scented northern variety, so these are the names given varietal status in the accompanying tabulation.

VARIETIES AND FORMS OF PHLOX MACULATA

NODES FEW (ABOUT 7–15) AND OFTEN REMOTE; UPPER LEAVES TENDING TO BECOME BROADLY LANCEOLATE AND CORDATE.

Phlox maculata odorata (Sweet) Wherry, status novus. *P. maculata* L. *P. odorata* Sweet. *P. reflexa* Sweet. Mountains of Tenn. to E. Mo., SE. Minn., and S. Que. Blooms chiefly in early Summer.

Form:

Light-colored (pink, white, etc.) *P. suaveolens* Aiton. *P. alba* Moench. *P. maculata* var. *suaveolens* Brand. Occasional.

NODES NUMEROUS (ABOUT 15–30), AND OFTEN CROWDED; UPPER LEAVES TENDING TO BECOME LINEAR- OR OBLONG-LANCEOLATE.

Phlox maculata pyramidalis (Smith) Wherry, status novus. *P. maculata* var. α *purpurea* Michaux. *P. pyramidalis* Smith. N. C. to Tenn., S. Ind., and S. Pa. Blooms chiefly in late Summer.

Forms:

Narrow-leaved. Typified by specimen from Spring City, Rhea Co., Tenn., collected by E. T. W., Sept. 12, 1927. Frequent, Tenn. & Ky.

Light-colored (pink, white, etc.) *P. maculata* var. β *candida* Michaux. *P. tardiflora* Penny. *P. longiflora* Sweet. *P. omniflora* Loudon. Develops in most large colonies.

Cultivation.—The early introduction of this species into horticulture was referred to under History. That it found favor for a time is indicated by the frequency with which it was illustrated, under one name or another, in the literature of the early 19th century. More recently its use gradually diminished and it is today rarely seen in cultivation.

The Grasses of the Muhlenberg Herbarium

A. S. HITCHCOCK

Dr. G. H. E. Muhlenberg (1753–1815), the earliest American botanist to specialize on grasses, was active for many years in studying the flora of eastern Pennsylvania and neighboring parts of New Jersey. He sent plants to Willdenow in Berlin, who published in his ''Enumeratio'' (1809) descriptions of many new species based upon his specimens. Muhlenberg published his Catalogue[1] in 1813. He received plants from Elliott, Baldwin, and others, but seems to have had no knowledge of Pursh's ''Flora Americae Septentrionalis'' His ''Description of Grasses,''[2] which contained descriptions also of rushes and sedges, was published two years after his death. Elliott published several species received from Muhlenberg, giving the latter as the author.

We are concerned here with the grasses described in the ''Descriptio.'' They are listed in the Catalogue but there are no descriptions, though an English name, which is often descriptive, has been given to each species. It is best to consider all names here to be *nomina nuda* except as they are occasionally based on cited synonyms.

Dr. Francis W. Pennell, Curator of the herbarium of the Philadelphia Academy of Natural Sciences, has given me the following information concerning the Muhlenberg Herbarium:

''The Muhlenberg Herbarium was purchased from Dr. F. A. Muhlenberg, son of the botanist, and at a meeting on February 20, 1818, it was presented by nine donors to the American Philosophical Society.[3] With other botanical collections, such as the Lewis and Clark plants and the herbarium of Professor B. S. Barton, it was subsequently deposited by the

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[1] Catalogus Plantarum Americae Septentrionalis. Lancaster, Pa., 1813.

[2] Descriptio Uberior Graminum. Philadelphia, 1817. This appeared as early as June, but after pages 1 to 296 of Elliott's ''Sketch of the Botany of South Carolina and Georgia'' had been issued.

[3] Proc. Amer. Philos. Soc. 22: 478. 1884.

American Philosophical Society at this Academy, according to a resolution passed by that Society, May 14, 1897.

"The grasses seem to have had a somewhat different history according to a note which is written on the first folder of the Muhlenberg Herbarium. The note reads:

> "This Herbarium of the Grasses I purchased from the son of Dr. Muhlenberg shortly after the death of that eminent botanist. I transferred the specimens into new papers and pasted the original covers on the backs of these parcels. All the writing on them (except the figures in red ink which are mine) is by Dr. Muhlenberg himself. The specimens are numerous in most instances in these folios, and they are labeled in the hand writing of Muhlenberg, and most of the eminent European Botanists, his correspondents. In desiring the Philosophical Society to be possessed of this Herbarium, which I consider a most important and valuable one, I have been actuated by the wish that all the collections of the indefatigable man who first led the way to a correct flora of America, should be together, in one place.
>
> WILLIAM P. C. BARTON,
> April 28, 1831."

Recently, through the courtesy of Dr. Pennell, I had the opportunity to examine the Muhlenberg grasses. Only those grasses that formed the basis of the "Descriptio" were studied; the Old World grasses received from correspondents were not examined.

A partial study of the Muhlenberg grasses was made by E. D. Merrill and published in a circular (U. S. Dept. Agr. Div. Agrost. Circ. 27. 1900) which has long been out of print. Merrill confined himself to the genus *Panicum* in which he was especially interested at the time.

The plants of the herbarium are in folders about 9 by 14 inches, several sewed together like the signatures of a book. A list of the names with numbers is on the first folder of a signature, and a number is on each leaf. The specimens, lying loose in the folders, are mostly fragmentary and mostly without labels or notes of any kind. When there are mixtures of species, as is often the case, I have attempted to determine which element is to be coordinated with the corresponding name.

In the following account, the species have been arranged in the sequence in which they appear in the "Descriptio." The heading of each species has the number in the Roman numeral given the genus in the work, the number of the species in the genus, the number (in parentheses) of the folder in which the corresponding specimens are found, the name of the species as it appears in the work, and finally the page on which the name is found. The author of the name was usually not given by Muhlenberg and has been added in brackets. In only a few cases are his own species indicated by "Mihi." It is therefore difficult to be certain which names are meant to be new and which are old names misapplied. The sequence of the folders is approximately that of the species in the book. A few species are not represented by specimens.

I. 1. (1). CINNA ARUNDINACEA L. Page 1. The specimens belong to this species.

II. 1. (2). ANTHOXANTHUM ODORATUM L. Page 2. The specimens belong to this species.

Genera III to X belong to Cyperaceae.

XI. 1. (82). CENCHRUS ECHINATUS [L.]. Page 51. Folder 82 contains a small specimen of *C. echinatus* mixed with several specimens of *C. tribuloides.* Muhlenberg's citation, "Habitat ad Susquehannam, floret Aug. Pennsylvania, Georgia, N. Caesarea," is puzzling, since *C. echinatus* is not known from north of South Carolina. It seems probable that the Pennsylvania and New Jersey plants must have been the common sandbur of sandy soils in the interior (*C. pauciflorus* Benth.) though his description does not give the distinguishing characters. Several early floras of the northeastern United States, for example, Torrey's Flora,[4] include *C. echinatus,* but the descriptions show that the species referred to is *C. pauciflorus.*

XI. 2. (83). CENCHRUS TRIBULOIDES [L.]. Page 52. The specimens are the typical *C. tribuloides* of the seacoast with large villous burs.

XII. 1. (85). SPARTINA POLYSTACHYA [(Michx.) Beauv.]. Page 53. The folder contains a mixture of *S. cynosuroides* (L.) Roth and *S. pectinata* Bosc. (*S. michauxiana* Hitchc.). Muhlenberg's description includes both species. He describes the blades as flat but adds, "Haec ad aquas salsas foliis *convolutis* et tunc cynosuroides," and gives *Trachynotia polystachya* [*S. cynosuroides* (L.) Roth] as a synonym. Torrey also includes both species under *S. cynosuroides* but his description refers to *S. cynosuroides* of the seacoast. He mentions a plant from Albany which is evidently *S. pectinata*.

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[4] Fl. North. & Mid. States 68. 1823.

XII. 2. (84). SPARTINA GLABRA [Muhl.]. Page 54. The specimens belong to *S. alterniflora* Loisel, agreeing with the scarcely distinct var. *pilosa* (Merr.) Fernald, with sparsely pilose florets and more imbricate spikelets. *S. glabra* was published a little earlier by Elliott (Muhl.; Ell. Bot. S. C. & Ga. 1: 95. pl. 4. f. 2. 1816). In this the spikelets are glabrous.

XII. 3. (86). SPARTINA JUNCEA [(Michx.) Willd.]. Page 54. The folder contains a mixture of *S. patens* var. *juncea* (Michx.) Hitchc. (which is only a form of *S. patens* (Ait.) Muhl.), *S. alterniflora* var. *glabra* (Muhl.) Fernald, and *S. pectinata* Bosc. (*S. michauxiana* Hitchc.). The description applies to the first of these.

XII. 4. (87). SPARTINA PATENS [(Ait.) Muhl.]. Page 55. The specimens belong to this species.

XIII. 1. (88). MUHLENBERGIA DIFFUSA [Willd.]. Page 56. The specimens belong to this species. (=*M. schreberi* Gmel.)

XIII. 2. (89). MUHLENBERGIA ERECTA [Schreb.]. Page 57. The specimens belong to this species. (=*Brachyelytrum erectum* (Schreb.) Beauv.)

XIV. 1. (90). LEERSIA ORYZOIDES [(L.) Swartz]. Page 58. The specimens belong to this species.

XIV. 2. (91). LEERSIA VIRGINICA Willd. Page 59. The specimens belong to this species.

XV. 1. (92). TRICHODIUM LAXIFLORUM [Michx.]. Page 60. The specimens belong to this species. (=*Agrostis hiemalis* (Walt.) B.S.P.) *Trichodium laxum* Schult. is based upon *T. laxiflorum* Muhl. which Schultes assumed to be different from *T. laxiflorum* Michx.

XV. 2. (93). TRICHODIUM DECUMBENS [Michx.]. Page 60. The specimens belong to this species. (=*Agrostis perennans* (Walt.) Tuckerm.) They are the weak decumbent form that grows in shady places.

XV. 3. (94). TRICHODIUM SCABRUM [(Willd.) Muhl.]. Page 61. The folder contains a mixture of *Poa compressa* L., *Agrostis alba* L., *A. perennans*, and *A. hiemalis*. The description applies best to *A. hiemalis* (Walt.) B.S.P. The binomial in the text was first published in Muhlenberg's Catalogue (1813), where *Agrostis scabra* Willd. is cited as a synonym.

Folder 95 is marked in the list on the outside *Trichodium* var. *aristosa.* The specimen is *Agrostis perennans.* Muhlenberg mentions under *T. scabrum* a variety with awns. The specimen, however, is awnless.

XV. 4. (96). TRICHODIUM [without specific name]. Page 62. The specimens belong to *Agrostis perennans* (Walt.) Tuckerm. *Trichodium muhlenbergianum* Schult.[5] is based on Muhlenberg's *Trichodium* no. 4.

Folder 97, without name, contains a specimen of *A. hiemalis.*

XVI. 1. (101). AGROSTIS TENUIFLORA [Willd.]. Page 63. The specimens belong to this species. (=*Muhlenbergia tenuiflora* (Willd.) B. S. P.

XVI. 2. (102). AGROSTIS DIFFUSA [*Muhl.*]. Page 64. The folder contains specimens which agree with Muhlenberg's description and are accepted as the type, and one plant of *Muhlenbergia mexicana* (L.) Trin. *Agrostis diffusa* (1817) is invalidated by *A. diffusa* Host (1809). (=*Muhlenbergia umbrosa* Scribn.)

XVI. 3. (103). AGROSTIS SERICEA [Ell.]. Page 64. The specimen is *Muhlenbergia capillaris* (Lam.) Trin. The true *Agrostis sericea* Ell. is *Muhlenbergia capillaris* var. *filipes* (M. A. Curtis) Chapm.

XVI. 4. (104. AGROSTIS STRICTA [Muhl.]. Page 65. The specimens belong to this species. (=*Agrostis tenuis* var. *aristata* (Parn.) Druce.) *Agrostis stricta* Muhl. (1817) is invalidated by *A. stricta* Gmel. (1791).

XVI. 5. (105). AGROSTIS FILIFORMIS [Willd.]. Page 66. The specimens belong to this species. (=*Muhlenbergia foliosa* (Roem. & Schult.) Trin.) There is a specimen of *M. mexicana* intermixed. *Agrostis filiformis* Willd. (1809) is invalidated by *A. filiformis* Vill. (1787).

XVI. 6. (106). AGROSTIS MEXICANA [L.]. Page 67. The specimens belong to *Muhlenbergia foliosa* (Roem. & Schult.) Trin., the same as those in folder 105. It is difficult to determine whether Muhlenberg actually described two species under the names *A. filiformis* and *A. mexicana.* Under the first he states that the culms are scabrous below the nodes. This applies to *M. foliosa* (*A. filiformis*). Under the second he states that the culms are glabrous around the nodes. This would indicate that the second species was *M. mexicana* (*A.*

[5] Mant. 2: 159. 1824.

mexicana). But the remainder of the description of *A. mexicana* applies better to *M. foliosa* than to *M. mexicana*. Since the latter species is common in eastern Pennsylvania it may be that his description is drawn from both species even though the folder contains no specimens of *M. mexicana*. Possibly the specimen of *M. mexicana* in folder 102 belongs here.

XVI. 7. (107). AGROSTIS SETOSA [Muhl.]. Page 68. The specimens belong to this species. (=*Muhlenbergia racemosa* (Michx.) B. S. P.)

XVI. 8. (108). AGROSTIS DECUMBENS Gaudin. Page 68. The specimens belong mostly to *A. palustris* Huds. There is also a culm of *A. verticillata* in a slip. *A. decumbens* was originally described by Elliott (Muhl.; Ell. Bot. S. C. & Ga. 1: 136. 1816) and is the same as *A. verticillata* Vill., the valid name. Muhlenberg's description seems to apply to *A. palustris* Huds. (See next species.) Of the calyx valves [glumes] he says, "carina scabra." In *A. verticillata* the glumes are scabrous on the sides as well as on the keel whereas the glumes of *A. palustris* are scabrous only on the keel. Furthermore, *A. verticillata* occurs on the Atlantic coast only as a ballast plant. Elliott says it grows at Charleston, "perhaps imported." Muhlenberg may have received his small specimen of *A. verticillata* from Elliott and placed it with his own specimens of *A. palustris* without observing that it was different. *Agrostis palustris* grows in Muhlenberg's region. Muhlenberg credits the name *A. decumbens* to Gaudin. (=*A. palustris* Huds.)

XVI. 9. (109). AGROSTIS ALBA [L.]. Page 69. The specimens belong to *A. alba* L., that is, the common redtop. In recent literature the name *A. palustris* has been applied to this species but further study has shown that *A. palustris* Huds. is the creeping form that has been called *A. maritima*. It is cultivated as a lawn grass under the name "creeping bent."

XVI. 10. (110). AGROSTIS VULGARIS [With.]. Page 70. The specimens all belong to *A. alba* L. The description is meager and does not distinguish this species from the preceding one, *A. alba*.

XVI. 11. (111). AGROSTIS SOBOLIFERA [Muhl.]. Page 70. The specimens belong to this species. (=*Muhlenbergia sobolifera* (Muhl.) Trin.) The species was earlier described by Willdenow (Muhl.; Willd. Enum. Pl. 95. 1809).

XVI. 12. (112). AGROSTIS INDICA [L.]. Page 71. The specimens belong to **Sporobolus poiretii** (Roem. & Schult.)

Hitchc. (*Axonopus poiretii* Roem. & Schult.; *Sporobolus berteroanus* (Trin.) Hitchc. & Chase). Muhlenberg gives Georgia as the habitat of *A. indica.* The true *Sporobolus indicus* (L.) R. Br. (*Agrostis indica* L.) is a distinct species differing in the finer blades and more open panicle of slender ascending branches. This tropical American species is found in the United States only as a ballast plant.

XVI. 13. (113). AGROSTIS PUNGENS [Muhl.]. Page 72. The specimens belong to *Sporobolus virginicus* (L.) Kunth. It is probable that Muhlenberg was identifying his plants with the European *A. pungens* Schreb. (*Sporobolus arenarius* (Gouan) Duval-Jouve), a distinct species allied to the American *Sporobolus virginicus,* and did not intend to propose a new species.

XVI. 14. (114). AGROSTIS INVOLUTA [Muhl.]. Page 72. The specimens agree with the description. (=*Sporobolus asper* (Michx.) Kunth.)

XVI. 15. (115). AGROSTIS CLANDESTINA [Spreng.]. Page 73. The specimens belong to this species. (=*Sporobolus clandestinus* (Spreng.) Hitchc.)

XVI. 16. (116). AGROSTIS VIRGINICA [L.]. Page 74. The specimens belong to *Sporobolus vaginaeflorus* (Torr.) Wood, to which the description applies. Muhlenberg's note, "A. virginicae L. affinis sed ab A. pungente diversa," would imply that he thought his species was different from *A. virginica* L. It is probable that he was expressing a doubt as to the identity of his specimens, rather than that he was intending to describe a second *A. virginica.*

XVI. 17. AGROSTIS [without specific name]. Page 75. There is no specimen to correspond to this number. The description is inadequate and this species of Agrostis must remain unidentified as well as the following: *Agrostis affinis* Schult., based on Agrostis no. 17 (of Muhlenberg); *Sporobolus muhlenbergii* Kunth, based on *Agrostis affinis* Schult.; and *Vilfa muhlenbergii* Steud., based on *Sporobolus muhlenbergii* Kunth.

XVI. 18. AGROSTIS? GLAUCA [Muhl.]. Page 76. There is no specimen of this species. The description applies to *Calamagrostis cinnoides* (Muhl.) Barton. See *Arundo cinnoides* Muhl. (XXXVIII. 1).

XVII. 1. (118). MILIUM CILIATUM [Muhl.]. Page 77. The specimens belong to *Amphicarpum purshii* Kunth, to which the description applies. There is also a specimen of

Oryzopsis pungens (Torr.) Hitchc. intermixed. *Milium ciliatum* Muhl. is invalidated by *M. ciliatum* Moench 1802.

XVII. 2. MILIUM DISTICHUM [Muhl.]. Page 78. There are no specimens representing this species. The description indicates *Paspalum distichum* L., to which the name is referred by Chase (N. Amer. Sp. Paspalum, Contr. U. S. Nat. Herb. 28: 47. 1929).

XVII. 3. (117). MILIUM [without specific name]. Page 78. The specimens belong to *Amphicarpum floridanum* Chapm. *Milium? muhlenbergianum* Schult. is based on Muhlenberg's Milium no. 3. Hence, taking up the oldest specific name, this species becomes **Amphicarpum muhlenbergianum** (Schult.) Hitchc.

XVIII. [1]. (119). ORYZOPSIS MELANOCARPA [Muhl.]. Page 79. The specimens belong to this species. (=*Oryzopsis racemosa* (J. E. Smith) Ricker).

XIX. 1. (120). ALOPECURUS PRATENSIS [L.]. Page 80. The specimens belong to this species.

XIX. 2. (121). ALOPECURUS GENICULATUS [L.]. Page 81. The specimens mostly belong to this species. There are plants of *A. pratensis* and *A. carolinianus* Walt. (*A. ramosus* Poir.) intermixed.

XX. [1]. (122). PHLEUM PRATENSE [L.]. Page 82. The specimens belong to this species.

Folder 123 contains *Oryzopsis miliacea* (L.) Benth. & Hook. and *Agrostis verticillata* Vill. These seem to have no connection with the book.

Folder 124 contains a small specimen of what appears to be *Agrostis perennans* (Walt.) Tuckerm.

Folder 125 contains a sterile specimen of *Muhlenbergia*, probably *M. schreberi* Gmel.

XXI. 1. (126). AIRA MOLLIS [Muhl.]. Page 82. The specimens belong to *Sphenopholis nitida* (Spreng.) Scribn. *Aira mollis* Muhl. is invalidated by *Aira mollis* Schreb. (1771).

XXI. 2. (127). AIRA TRUNCATA [Muhl.]. Page 83. The specimens belong to this species. (=*Sphenopholis obtusata* (Michx.) Scribn.).

XXI. 3. (128 and 129). AIRA PALLENS [Spreng.]. Page 84. Folder 128, listed as "pallens," contains a mixture of *Sphenopholis intermedia* Rydb., *S. nitida* (Spreng.) Scribn., *S. obtusata* (Michx.) Scribn., *Deschampsia flexuosa* (L.)

Trin. and *Poa sylvestris* Gray. None of these corresponds to the description except as noted under the next folder.

Folder 129, listed as "var. aristata," contains two species. One of these is *Trisetum pennsylvanicum* (L.) Beauv. The other, consisting of two panicles only, corresponds to the description of *Aira pallens*. The significant part of Muhlenberg's description is "Cor. gluma 2-valvis puncticulata, flosculi sessilis mutica, pedicellati aristata, arista paulo infra apicem sive dorsali contorta, pedicello flosculi laevi nec pubescente." Under habitat of *A. pallens* he says "in pratis humidis et varietas omnino mutica in sylvis." The awnless variety mentioned here probably refers to the specimens of *Sphenopholis nitida* in folder 128. *Aira pallens* was originally described by Sprengel (Mant. Fl. Hal. 33. 1807) from specimens sent by Muhlenberg from Pennsylvania. Sprengel's description of *A. pallens* is essentially the same as that of Muhlenberg. *Aira pallens* was misunderstood by Scribner when he transferred the name to his newly proposed genus *Sphenopholis*. It proves to be the rare species described by Scribner and Merrill as *Eatonia aristata* (*Sphenopholis aristata* Heller). This species is known only from the Muhlenberg collection and from a Curtiss collection in South Carolina in 1875 (type of *Eatonia aristata*). The species Scribner had in mind for *Sphenopholis pallens* was later described as *S. intermedia* Rydb. In this the florets are both awnless.

XXI. 4. (130). AIRA CAESPITOSA [L.]. Page 85. The specimens belong to this species. (=*Deschampsia caespitosa* (L.) Beauv.).

XXI. 5. (131). AIRA FLEXUOSA [L.]. Page 85. The specimens belong to this species. (=*Deschampsia flexuosa* (L.) Trin.).

XXI. 6. (132). AIRA PRAECOX L. Page 86. The specimens belong to this species.

XXI. 7. (133). AIRA PURPUREA Walt. Page 86. The specimens belong to this species. (=*Triplasis purpurea* (Walt.) Chapm.).

Folder 134 contains specimens of *Triodia langloisii* (Nash) Bush, which is not described by Muhlenberg.

XXII. 1. (135). MELICA SPECIOSA [Muhl.]. Page 87. The specimens belong to this species. (=*Melica mutica* Walt.).

XXII. 2. (136). MELICA RACEMOSA [Muhl.]. Page 88. The specimens, like those of folder 135, belong to *Melica mutica* Walt. There appears to be no essential difference in the descriptions of the two species.

XXIII. 1. (137). PHALARIS ARUNDINACEA [L.]. Page 89. The specimens mostly belong to this species but there are specimens of *P. caroliniana* Walt. and *P. canariensis* L. intermixed.

XXIII. 2. (138). PHALARIS VILLOSA Michx. Page 90. Some of the specimens belong to this species (= *Anthaenantia villosa* (Michx.) Beauv.) and some to *A. rufa* (Ell.) Schult. Muhlenberg's description covers both species.

XXIII. 3. PHALARIS CAROLINIANA Walt. Page 91. There is no folder listed with this name. The specimens of *P. caroliniana* in folder 137 may go with this description.

XXIV. 1. (139). PASPALUM DEBILE [Michx.]. Page 91. The specimens belong to *P. ciliatifolium* Michx., to which this description applies.

XXIV. 2. (140). PASPALUM PUBESCENS [Muhl.]. Page 92. The specimens belong to this species which was described originally by Willdenow (Muhl. in Willd. Enum. Pl. 89. 1809). The type is in the Willdenow Herbarium at Berlin but Muhlenberg's specimens probably are a part of the type collection.

XXIV. 3. (141). PASPALUM CILIATIFOLIUM [Michx.]. Page 93. The folder contains specimens, some fragmentary, of *P. ciliatifolium* Michx., *P. pubescens* Muhl., *P. setaceum* Michx.; *P. psammophilum* Nash, *P. supinum* Bosc, *P. laeve* Michx., *P. circulare* Nash, and *P. bifidum* (Bertol.) Nash. It is impossible from the description to decide which species he had in mind. In a note at the end of the description *P. ciliatifolium* Swartz is erroneously cited.

XXIV. 4. (142). PASPALUM VIRGATUM? [L.]. Page 94. The specimens belong to *P. boscianum* Flügge and *P. giganteum* Baldw. The description applies better to the former.

XXIV. 5. (146). PASPALUM DISTICHUM [L.]. Page 95. The specimens belong to this species but mixed with it are *P. circulare* Nash, *P. pubescens* Muhl., and *Axonopus furcatus* (Flügge) Hitchc.

XXIV. 6. (145). PASPALUM MUCRONATUM [Muhl.]. Page 96. The specimens belong to this species. (= *P. repens* Bergius).

XXIV. 7. (149). PASPALUM [without specific name]. Page 96. The specimens belong to *P. dissectum* (L.) L., to which the description applies.

XXIV. 8. PASPALUM [without specific name]. Page 97. There is no folder for this. The species remains unidentified.

XXIV. 9. (143). Paspalum floridanum [Michx.]. Page 98. The specimens belong to this species, but *P. lentiferum* Lam., *P. laeve* Michx. and *P. circulare* Nash are intermixed.

XXIV. 10. (144). Paspalum laeve Michx. Page 98. The specimens belong to this species. There is a small amount of *P. floridanum* Michx. intermixed.

XXV. 1. (151). Panicum setaceum [Muhl.]. Page 99. The specimens belong to this species. (= *P. aciculare* Desv.). The folder is listed as *P. pungens.*

XXV. 2. (152). Panicum glaucum [L.]. Page 100. The specimens belong to *Setaria lutescens* (Weigel) Hubbard, to which the name *Panicum glaucum* (or *Setaria glauca*) was erroneously applied by most authors since Linnaeus. The true *Panicum glaucum* of Linnaeus (Sp. Pl. 56. 1753) is the grass called in the United States pearl millet, cultivated in Africa by the natives for the seed used for food (see Linnaean concept of Pearl Millet by A. Chase, Amer. Journ. Bot. 8: 41. 1921).

XXV. 3. (153). Panicum laevigatum [Muhl.]. Page 100. The specimens belong to this species. (= *Setaria geniculata* (Lam.) Beauv.). *Panicum laevigatum* was first published by Elliott (Muhl.; Ell. Bot. S. C. & Ga. 1: 112. 1816). There is an earlier *P. laevigatum* Lam. (1778).

XXV. 4. (154). Panicum [without specific name]. Page 101. The specimens, as in folder 153, belong to *Setaria geniculata* (Lam.) Beauv. *S. affinis* Schult. is based on this.

XXV. 5. (156). Panicum verticillatum [L.]. Page 102. The specimens belong to this species. (= *Setaria verticillata* (L.) Beauv.).

XXV. 6. (155). Panicum viride [L.]. Page 102. The specimens belong to this species. (= *Setaria viridis* (L.) (Beauv.). Specimens of *S. geniculata* are intermixed.

XXV. 7. (159). Panicum hirtellum [L.]. Page 103. The specimens belong to *Oplismenus setarius* (Lam.) Roem. & Schult. *Setaria hirtella* Schult. is based on this. *Panicum hirtellum* (*Oplismenus hirtellus* (L.) Beauv.) is an allied species of tropical America.

XXV. 8. (157). Panicum italicum [L.]. Page 103. Some of the specimens are this species (= *Setaria italica* (L.) Beauv.), and some are *S. magna* Griseb.

XXV. 9. (158). Panicum germanicum [Mill.]. Page 104. The specimens belong to *Setaria italica* (L.) Beauv. Specimens of *S. geniculata* are intermixed.

XXV. 10. (160). PANICUM CRUSGALLI [L.]. Page 105. The specimens, some long-awned, some nearly awnless, belong to this species. (=*Echinochloa crusgalli* (L.) Beauv.).

XXV. 11. (161). PANICUM [without specific name]. Page 106. There is no specimen in folder 161. The description of *Panicum* no. 11 indicates that it is the awnless form of *Echinochloa crusgalli*, whereas that of no. 10 is the awned form. It would appear that the specimens of folder 161 have been placed with those of folder 160.

XXV. 12. (163). PANICUM [without specific name]. Page 106. The specimens belong to *Echinochloa colonum* (L.) Link.

XXV. 13. (162). PANICUM HISPIDUM [Muhl.]. Page 107. The specimens belong to this species. (=*Echinochloa walteri* (Pursh) Heller). There is an earlier *P. hispidum* Forst. (1786).

XXV. 14. (164). PANICUM WALTERI [Muhl.]. Page 108. The specimens belong to this species. (=*P. hemitomon* Schult.). *P. walteri* was first published by Elliott (Muhl.; Ell. Bot. S. C. & Ga. 1: 115. 1816). There is an earlier *P. walteri* Pursh (1814).

XXV. 15. 165). PANICUM MOLLE Michx. Page 108. The specimens belong to this species. (=*Eriochloa michauxii* (Poir.) Hitchc.). There is an earlier *P. molle* Swartz (1788).

XXV. 16. (166). PANICUM LATIFOLIUM [L.]. Page 109. The specimens belong to this species. Plants of *P. boscii* Poir., *P. boscii* var. *molle* (Vasey) Hitchc. & Chase, *P. ravenelii* Scribn. & Merr., *P. clandestinum* L., *P. joorii* Vasey and *P. commutatum* Schult. are intermixed.

XXV. 17. (167). PANICUM SCOPARIUM Michx. [Lam.]. Page 109. The specimens belong to this species. A plant of *P. ravenelii* is intermixed. Muhlenberg gives Michaux as the author but Lamarck published the species originally, though he obtained his specimen from Michaux.

XXV. 18. (168). PANICUM CLANDESTINUM [L.]. Page 110. The specimens belong to this species.

XXV. 19. (169). PANICUM MICROCARPON [Muhl.]. Page 111. The specimens belong to this species. (=*P. polyanthes* Schult.). Specimens of *P. clandestinum* and *P. commutatum* are intermixed. *P. microcarpon* Muhl. as published by Elliott a little earlier (Muhl.; Ell. Bot. S. C. & Ga. 1: 127. 1816) is a different valid species.

XXV. 20. (170). PANICUM DEPAUPERATUM [Muhl.]. Page 112. The specimens belong to this species. Specimens of *P. linearifolium* Scribn. are intermixed. Some of the specimens of *P. depauperatum* have pubescent sheaths and some have glabrous sheaths. A specimen with pilose sheaths has been selected as the type[6] because Muhlenberg's description reads "vagina pilosa."

XXV. 21. (172). PANICUM DICHOTOMUM [L.]. Page 112. The specimens belong to this species. Intermixed are specimens of *P. yadkinense* Ashe, *P. lucidum* Ashe, *P. microcarpon* Muhl., and *P. huachucae* var. *fasciculatum* (Torr.) Hubbard.

XXV. 22. (171). PANICUM VERRUCOSUM "Mihi." [Muhl.]. Page 113. The specimens belong to this species.

XXV. 23. (173). PANICUM DISCOLOR Spreng. Page 114. The folder contains a mixture of *P. microcarpon* Muhl.; Ell., *P. ashei* Pearson, *P. arenicoloides* Ashe, *P. sphaerocarpon* Ell. and *P. barbulatum* Michx. The description appears to cover more than one species, but the "nodis retrorsum pilosis" would indicate *P. microcarpon* Muhl.; Ell. as the chief component. *P. discolor* Spreng. (1807), originally described from Pennsylvania, has not been identified. The description does not well apply to any of the species in folder 173.

XXV. 23. (174). "CO-SPECIES VEL VARIETAS MAJOR." Page 115. The specimens belong to *P. mattamusketense* Ashe.

XXV. 24. (175). PANICUM PUBESCENS Michx. Page 116. The specimens belong to *Panicum scoparium* Lam. Muhlenberg cites *P. pubescens* Michx., but Michaux credits the species to Lamarck. The species is the same as *P. scoparium* Lam. Muhlenberg states in a note that his *P. pubescens* is "affine num. 17" [*P. scoparium*].

XXV. 25. PANICUM NERVOSUM [Muhl.]. Page 116. There is no folder with this name. The next folder, 176, refers to the next species. *Panicum nervosum* as published by Elliott (Muhl.; Ell. Bot. S. C. & Ga. 1: 122. 1816) is *P. commutatum* Schult. There is an earlier *P. nervosum* Lam. (1798).

XXV. 26. (176). PANICUM MELICARIUM [Michx.]. Page 117. The specimens belong to *Sporobolus gracilis* (Trin.) Merr. with a little *S. curtissii* (Vasey) Small intermixed. The description appears to apply to the specimens of *S. gracilis*, except that the calyx (glumes) is said to be 3-valved, the third very short. *P. melicarium* Michx. is *Glyceria melicaria* (Michx.) Hubbard.

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[6] N. Amer. Sp. Panicum. Contr. U. S. Nat. Herb. 15: 151. 1910.

XXV. 27. PANICUM [without specific name]. Page 118. There is no folder for this. The species cannot be identified from the description. *Panicum muhlenbergianum* Schult. is based on *Panicum* no. 27 of Muhlenberg.

XXV. 28. (192). PANICUM TENUE [Muhl.]. Page 118. The specimens belong to this species. Intermixed are *P. ciliatum* Ell., *P. trifolium* Nash, and *P. vernale* Hitchc. & Chase.

XXV. 29. (177). PANICUM AGROSTOIDES [Spreng.]. Page 119. The specimens belong to this species. Intermixed are *P. stipitatum* Nash and *P. rhizomatum* Hitchc. & Chase. Sprengel states that his specimens came from Muhlenberg.

XXV. 30. (179). PANICUM VIRGATUM [L.]. Page 120. Most of the specimens belong to this species. Intermixed are plants of *P. virgatum* var. *cubense* Griseb. and of *P. amarum* Ell.

XXV. 31. (178). PANICUM DIVERGENS [Muhl.]. Page 120. The specimens belong to this species. (=*Leptoloma cognatum* (Schult.) Chase). *P. divergens* was published by Elliott (Muhl.; Ell. Bot. S. C. & Ga. 1: 130. 1816). There is an earlier *P. divergens* H. B. K. (1815).

XXV. 32. (180). PANICUM ROSTRATUM [Muhl.]. Page 121. Most of the specimens belong to this species. (=*P. anceps* Michx.). Intermixed are specimens of *P. rhizomatum* Hitchc. & Chase, and *P. stipitatum* Nash. *P. rostratum* was published by Willdenow (Muhl.; Willd. Enum. Pl. 1032. 1809).

XXV. 33. PANICUM DENSUM [Muhl.]. Page 122. There is no folder for this species. The species cannot be identified from the description, but appears to be one of the group Lanuginosa.

XXV. 34. (181). PANICUM GENICULATUM [Muhl.]. Page 123. The specimens belong to this species. (=*P. dichotomiflorum* Michx.). *P. geniculatum* was first published by Muhlenberg in his Catalogue, 1813, based on *P. dichotomiflorum* Michx. There is an earlier *P. geniculatum* Lam. (1798).

XXV. 35. (182). PANICUM CAPILLARE "H. L." [L.]. Page 124. The specimens belong to this species.

XXV. 35. (183). "VARIETAS MINOR OCCURRIT UBIQUE IN CULTIS MAGIS ARIDIS." Page 124. The specimens belong to *Panicum philadelphicum* Bernh. Muhlenberg does not give this a varietal name.

XXV. 36. (187). PANICUM ACUMINATUM Swartz. Page 125. Most of the specimens belong to *P. xalapense* H. B. K., to which the description applies. Intermixed are *P. lancearium* Trin., *P. huachucae* Ashe, *P. commonsianum* Ashe, and *P. webberianum* Nash. *P. acuminatum* Swartz is a West Indian species. *P. muhlenbergii* Spreng. (Syst. Veg. 1: 314. 1825) is *P. depauperatum* Muhl., as indicated by the type specimen in the Sprengel Herbarium, though Sprengel cites "Amer. bor. (*P. acuminatum* Muhl.)."

XXV. 37. (184). PANICUM [without specific name]. Page 125. The specimens belong to *P. spretum* Schult., with *P. scoparium* Lam. intermixed. *P. spretum* is based on Muhlenberg's Panicum no. 37.

XXV. 38. (185). PANICUM AQUATICUM [Muhl.]. Page 126. The specimens belong to this species. (=*Sacciolepis striata* (L.) Nash). Specimens of *P. sphagnicola* Nash and of *P. commutatum* Schult. are intermixed. There is an earlier *P. aquaticum* Poir. (1816). *P. hydrophilum* Schult. is based on *P. aquaticum* Muhl.

XXV. 39. PANICUM [without specific name]. Page 127. There is no folder for this. "Panicum n. 39, Mühlenb. gram. p. 127." is cited by Sprengel as a synonym of *P. tremulum* Spreng. (Neu. Entd. 2: 103. 1821). This is *P. dichotomum* L. The label accompanying Sprengel's type reads, "*Panicum tremuloides** Mühlenb. gram. p. 127." Muhlenberg's description applies to *P. dichotomum.*[7]

XXV. 40. (186). PANICUM CILIATUM Ell. Page 127. Most of the specimens belong to this species. Intermixed are specimens of *P. lancearium* Trin., one with glabrous spikelets and one with pubescent spikelets.

XXV. 41. PANICUM CARTILAGINEUM [Muhl.]. Page 128. There is no folder for this. The description suggests *P. leucothrix* Nash.

There are a few folders with numbers but there are no names listed to correspond. These folders contain species not described in the "Descriptio."

(188). Contains *Panicum maximum* Jacq.

(189). Contains *Panicum condensum* Nash with *P. rhizomatum* Hitchc. and Chase and *P. anceps* Michx. intermixed.

(190). Contains *Panicum chamaelonche* Trin.

[7] See Contr. U. S. Nat. Herb. 15: 190. 1910.

(191). Contains *Panicum commutatum* Schult. with an intermixture of *P. clandestinum* L., *P. lindheimeri* Nash, and *P. villosissimum* Nash.

(193). Contains *Amphicarpum muhlenbergianum* (Schult.) Hitchc.

(194). Contains *Panicum oligosanthes* Schult., *P. aciculare* Desv., *P. villosissimum* Nash, and *P. commutatum* Schult.

XXVI. 1. (195). DIGITARIA SANGUINALIS [(L.) Scop.]. Page 129. Most of the specimens belong to this species. *D. ischaemum* (Schreb.) Muhl. is intermixed.

XXVI. 2. (196). DIGITARIA SEROTINA [Michx.]. Page 130. The specimens belong to this species.

XXV. 3. (197). DIGITARIA ISCHAEMUM Schreb. [(Schreb.) Muhl.]. Page 131. Most of the specimens belong to this species. *D. sanguinalis* and *D. villosa* (Walt.) Pers. are intermixed. The name is obviously based on *Panicum ischaemum* Schreb., though Muhlenberg gives Schreber as author of *Digitaria ischaemum.*

XXVI. 4. (198). DIGITARIA FILIFORMIS [(L.) Koel.]. Page 131. Most of the specimens belong to this species. *D. ischaemum* and *D. villosa* are intermixed.

XXVI. 5. (199). DIGITARIA DACTYLON [(L.) Scop.]. Page 132. The specimens belong to this species. (=*Cynodon dactylon* (L.) Pers.).

XXVII. 1. (201). ELEUSINE INDICA Willd. Enum. [(L.) Gaertn.]. Page 133. The specimens belong to this species.

XXVII. 2. (202). ELEUSINE MUCRONATA [Michx.]. Page 134. The specimens belong to this species. (=*Leptochloa filiformis* (Lam.) Beauv.).

XXVII. 3. (203). ELEUSINE SPARSA [Muhl.]. Page 135. There is no specimen in the folder, which is listed as *Dactylis glomerata.* From the description *E. sparsa* appears to be a small form of *Leptochloa filiformis* (Lam.) Beauv.

XXVIII. (98). DACTYLIS GLOMERATA [L.]. Page 136. The specimens belong to this species.

XXIX. 1. (204). POA ANNUA [L.]. Page 137. The specimens belong to this species.

XXIX. 2. (205). POA BREVIFOLIA [Muhl.]. Page 138. The specimens belong to this species. (=*P. cuspidata* Nutt.). There is an earlier *P. brevifolia* DC. 1806.

XXIX. 3. (206). POA VIRIDIS [Schreb.]. Page 138. The specimens belong to *P. pratensis* L. The name appears in

Pursh's Flora (*P. viridis* Schreb.; Pursh, Fl. Amer. Sept. 1: 79. 1814) but Muhlenberg seems not to have been acquainted with this work.

XXIX. 4. (207). POA STOLONIFERA Haller. Page 139. The specimens belong to *Poa trivialis* L. There is a *P. stolonifera* Bell. of Europe which is a synonym of *P. cenisia* All. There is no *P. stolonifera* Haller, hence Muhlenberg's species is to be regarded as new (*P. stolonifera* Haller; Muhl. Descr. Gram. 138. 1817).

XXIX. 5. (208). POA NERVATA [Willd.]. Page 140. The specimens belong to this species. (= *Glyceria striata* (Lam.) Hitchc.).

XXIX. 6. (209). POA COMPRESSA [L.]. Page 141. The specimens belong to this species.

XXIX. 7. (210). POA PILOSA [L.]. Page 141. Most of the specimens belong to this species. (= *Eragrostis pilosa* (L.) Beauv.). There is a specimen of *E. pectinacea* (Michx.) Nees intermixed.

XXIX. 8. (211). POA REPTANS [Michx.]. Page 142. The specimens belong to *Eragrostis hypnoides* (Lam.) B. S. P. *Poa reptans* Michx. (= *Eragrostis reptans* (Michx.) Nees) is a distinct species, which has been confused with *E. hypnoides* (See Rhodora 28: 113. 1926).

XXIX. 9. (212). POA GLOMERATA Walt. Page 143. The specimens belong to this species. (= *Eragrostis glomerata* (Walt.) Dewey).

XXIX. 10. (213). POA CAPILLARIS "H. L." [L.]. Page 144. Most of the specimens belong to this species. (= *Eragrostis capillaris* (L.) Nees). Intermixed are fragments of *Eragrostis hirsuta* (Michx.) Nees, *E. refracta* (Muhl.) Scribn. and *E. cilianensis* (All.) Link.

XXIX. (214). "CO-SPECIES OCCURRIT." Page 145. Most of the specimens belong to *Eragrostis frankii* C. A. Meyer; Steud. Intermixed are *E. capillaris* and *E. spectabilis* (Pursh) Steud.

XXIX. 11. (215). POA HIRSUTA Michx. Page 145. Most of the specimens belong to this species. (= *Eragrostis hirsuta* (Michx.) Nees). Intermixed are *E. spectabilis* (Pursh) Steud. and *E. elliottii* S. Wats.

XXIX. 12. (216). POA REFRACTA [Muhl.]. Page 146. Most of the specimens belong to this species. (= *Eragrostis refracta* (Muhl.) Scribn.). Intermixed is a plant of *E. hirsuta*. The name listed for the folder is *reflexa*.

XXIX. 13. (217). Poa obtusa "Mihi." [Muhl.]. Page 147. Most of the specimens belong to this species. (= *Glyceria obtusa* (Muhl.) Trin.). Intermixed are *G. canadensis* (Michx.) Trin. and *G. laxa* Scribn.

XXIX. 14. (218). Poa flexuosa [Muhl.]. Page 148. The specimens belong to this species, which was published a little earlier by Elliott. (*P. autumnalis* Muhl.; Ell. Bot. S. C. & Ga. 1: 159. 1816). The folder is listed as *P. autumnalis.*

XXIX. 15. (219). Poa maritima? [Huds.]. Page 148. The specimen belongs to this species. (= *Puccinellia maritima* (Huds.) Parl.). The specimen is only a fragment marked "salt marsh."

XXIX. 16. (220). Poa sesleroides Michx. Page 149. The specimens belong to this species. (= *Triodia flava* (L.) Hitchc.).

XXIX. 17. (221). Poa palustris [L.]. Page 150. The specimens belong to this species. The folder is listed as *P. crocata* [Michx., a synonym of *P. palustris*].

XXIX. 18. (223). Poa? uniflora "Mihi" [Muhl.]. Page 151. The specimens belong to this species. (= *Muhlenbergia uniflora* (Muhl.) Fernald).

XXIX. 19. (222). Poa rigida [L.]. Page 151. The specimens belong to this species. (= *Scleropoa rigida* (L.) Griseb.).

Folder 224, listed as *Cynosurus coracanus,* contains specimens of *Eleusine coracana* (L.) Gaertn.

XXIX. 20. (225). Poa [without specific name]. Page 152. There is no specimen in the folder, which is listed "Poa —Baldwin 904."

XXX. 1. (226). Briza media [L.]. Page 152. The specimens belong to this species.

XXX. 2. (227). Briza canadensis Michx. Page 153. The specimens belong to this species. (= *Glyceria canadensis* (Michx.) Trin.).

XXX. 3. (228). Briza purpurascens [Muhl.]. Page 154. The specimens belong to *Eragrostis cilianensis* (All.) Link. There are several plants, all with many-flowered spikelets. The panicles are dark but scarcely purple. The description states that the spikelets are purplish, 5-flowered (see next number).

XXX. 4. (229). Briza eragrostis [L.]. Page 154. The specimens belong to this species. (= *Eragrostis cilianensis*

(All.) Link; *E. megastachya* (Koel.) Link). The plants are mostly immature with few-flowered spikelets, but some of the spikelets are many-flowered. The description of no. 4 states that the spikelets are 12 to 20-flowered. It is possible that the specimens in folders 228 and 229 have been interchanged, though all belong to the same species.

XXXI. 1. (230). UNIOLA LATIFOLIA [Michx.]. Page 155. The specimens belong to this species.

XXXI. 2. (231). UNIOLA PANICULATA [L.]. Page 156. The specimens belong to this species. There is also a sterile branch of *Arundinaria*.

XXXI. 3. (232). UNIOLA GRACILIS [Michx.]. Page 157. The specimens belong to *U. sessiliflora* Poir. (*U. longifolia* Scribn.). *U. gracilis* Michx. is the same as *U. laxa* (L.) B.S.P. Muhlenberg gives the habitat as Georgia to Mississippi, New Jersey, and Delaware. Since *U. sessiliflora* is not known north of Virginia it it probable that he confused this with *U. laxa* which grows as far north as New York.

XXXI. 4. (233). UNIOLA SPICATA L. Page 157. The specimens belong to this species. (=*Distichlis spicata* (L.) Greene).

Following *U. spicata* is "Co-species duae," under which are described two forms, (a) with *Festuca distichophylla* Michx. cited as synonym, and (b) with *U. maritima* Michx. cited as synonym. There is no separate folder for these. Among the specimens in folder 233 is a label *Festuca distichophylla*. Apparently the specimens of (a) and (b) have been placed in the folder with those of the species itself. *Festuca distichophylla* Michx. is *Distichlis spicata*. *Uniola maritima* Michx. is *U. paniculata* L.

XXXII. 1. (234). FESTUCA TENELLA [Willd.]. Page 159. The specimens belong to this species. (=*F. octoflora* Walt.).

XXXII. 2. (235). FESTUCA PROCUMBENS [Muhl.]. Page 160. The specimens belong to this species. (=*Leptochloa fascicularis* (Lam.) Gray).

XXXII. 3. (236). FESTUCA MYURUS [L.]. Page 160. Most of the specimens belong to this species, though there is also a plant of *F. sciurea* Nutt.

XXXII. 4. (237). FESTUCA UNIOLOIDES [Willd.]. Page 161. The specimens belong to this species. (=*Bromus catharticus* Vahl; *B. unioloides* H.B.K.). There is also a panicle of *Uniola paniculata* L. in the folder.

XXXII. 5. (238). FESTUCA CLANDESTINA "Mihi" [Muhl.]. Page 162. The specimens belong to this species. (=*Leptochloa fascicularis* (Lam.) Gray). The plants are depauperate, bearing a few small panicles near the base, partly hidden in the sheaths.

XXXII. 6. (239). FESTUCA RUBRA? [L.]. Page 162. The specimens belong to this species. The folder is listed as *glaucifolia.*

XXXII. 7. (240). FESTUCA DURIUSCULA [L.]. Page 163. The specimens belong to *F. rubra. F. duriuscula* is a variety of *F. ovina* (*F. ovina* var. *duriuscula* (L.) Koch).

XXXII. 8. (241). FESTUCA ELATIOR [L.]. Page 164. The specimens belong to this species.

XXXII. 9. (242). FESTUCA NUTANS [Spreng.]. Page 165. The specimens belong to this species. (=*F. obtusa* Spreng.) There is an earlier *F. nutans* Moench (1794).

Folder 243 contains *Festuca obtusa.* The cover is listed as, *sylvatica obtusa.* In a note appended to *F. nutans* Muhlenberg mentions a woodland variety "sylvatica" and a variety of wet ground, "palustris," but these names are not given as varietal names.

XXXII. 10. (244). FESTUCA FLUITANS [L.]. Page 166. The specimens belong to *Glyceria septentrionalis* Hitchc., a species allied to *Glyceria fluitans* (L.) R. Br. (*Festuca fluitans* L.)

XXXII. 11. (245). FESTUCA BREVIFOLIA [Muhl.]. Page 167. The specimens belong to this species. (=*Triplasis purpurea* (Walt.) Chapm.). There is a specimen of *Glyceria acutiflora* Torr. intermixed. Steudel (Nom. Bot. ed. 2. 1: 690. 1840) gives *Festuca brevifolia* Muhl. as a synonym of *Glyceria acutiflora* Torr. Possibly a specimen of the latter got into a European herbarium under that name. *Glyceria brevifolia* Schult. is based on *F. brevifolia* Muhl. Schultes' description applies to *Triplasis purpurea.*

XXXIII. 1. (246). BROMUS SECALINUS [L.]. Page 168. The specimens belong to this species. There is also a specimen of an unidentified European species of *Bromus.*

XXXIII. 2. (247). BROMUS PUBESCENS [Muhl.]. Page 169. The specimens belong to this species. (=*B. purgans* L.) *B. pubescens* was first published by Willdenow (Muhl.; Willd. Enum. Pl. 1: 120. 1809).

XXXIII. 3. (248). BROMUS CILIATUS L. Page 169. The folder contains a mixture of *Triodia langloisii* (Nash) Bush, *Leptochloa fascicularis* (Lam.) Gray, *Briza minor* L., *Bromus purgans* L., *B. commutatus* Schrad. and *B. kalmii* Gray. There is more of the last species than of any other and this probably is the basis of Muhlenberg's *B. ciliatus*. His description of the lemmas, "valvulis margine ciliatis et undique hirsutis" would point toward that species.

XXXIII. 4. (249). BROMUS PURGANS [L.]. Page 170. Most of the specimens belong to this species but one is *B. ciliatus* L.

Folder 250 contains *Bromus ciliatus* var. *laeviglumis* Scribn.

XXXIV. 1. (251). ARISTIDA DICHOTOMA [Michx.]. Page 171. Most of the specimens belong to this species. Intermixed is a specimen of *A. longespica* Poir.

XXXIV. 2. (252). ARISTIDA RACEMOSA [Muhl.]. Page 172. The specimens belong to this species. (= *A. palustris* (Chapm.) Vasey). Muhlenberg's name is invalidated by *A. racemosa* Spreng. (1807). In my revision of *Aristida*[8] I assigned this name to *A. purpurascens* Poir. The folder is listed as *A. oligantha*.

XXXIV. 3. ARISTIDA OLIGANTHA [Michx.]. Page 173. There is no folder for this species. The folder of the preceding species is marked *A. oligantha* but the specimens correspond to the description of *A. racemosa*.

XXXIV. 4. (253). ARISTIDA LANOSA [Muhl.]. Page 174. The specimens belong to this species. The folder is listed as *A. lanata* [Poir. not Forsk.] which is the same as *A. lanosa* Muhl.

XXXIV. 5. (254). ARISTIDA STRICTA [Muhl.]. Page 174. The specimens belong to this species. (= *A. spiciformis* Ell.). There is an earlier *A. stricta* Michx. (1803).

Folder 255 contains *Aristida stricta* Michx., *A. spiciformis* Ell. and *A. lanosa* Muhl. The description of *A. stricta* Muhl. applies to *A. spiciformis* rather than to *A. stricta* Michx.

XXXV. 1. (256). ELYMUS VILLOSUS [Muhl.]. Page 175. The specimens belong to this species. (= *E. striatus* Willd.). There is also a specimen of *E. virginicus* var. *hirsutiglumis* (Scribn.) Hitchc. *E. villosus* was published by Willdenow (Muhl.; Willd. Enum. Pl. 1: 131. 1809).

XXXV. 2. (257). ELYMUS VIRGINICUS [L.]. Page 176. The specimens belong to this species.

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[8] Contr. U. S. Nat. Herb. 22: 571. 1924.

XXXV. 3. (258). Elymus glaucifolius Willd. Enum. Page 177. The specimens belong to *E. canadensis* L. They are the glaucous form similar to the type of *E. canadensis.*[9]

XXXV. 4. (259). Elymus canadensis [L.]. Page 178. The specimens belong to *E. riparius* Wieg. The folder is listed as *E. striatus.*

Folder 260 is listed as *Elymus canadensis.* It contains a spike of this species. The description of *E. canadensis* probably covers the plants in both folders.

XXXV. 5. (262). Elymus hystrix [L.]. Page 178. The specimens belong to this species. (=*Hystrix patula* Moench).

XXXV. 6. (261). Elymus ciliatus [Muhl.]. Page 179. The folder contains a part of a spike which resembles *E. striatus* Willd. but differs in having terete setaceous glumes not nerved in the lower part, the floret and awn longer than in *E. striatus.* The meager description does not aid in the identification. The name is referred as a synonym to *E. striatus.*

XXXV. 8. Elymus striatus [Willd.]. Page 180. There is no folder for this.

XXXV. 8. Elymus europaeus [L.]. Page 180. There is no folder for this.

XXXVI. 1. (263). Stipa avenacea [L.]. Page 181. The specimens belong to this species.

XXXVI. 2. Stipa juncea [Michx.]. Page 182. There is no folder for this. *Stipa juncea* is the same as *Oryzopsis canadensis* (Poir.) Torr. (*S. juncea* Michx., 1803, not L. 1753.).

XXXVI. 3. (264. Stipa melanocarpa [Muhl.]. Page 183. The specimens belong to this species. (=*Heteropogon melanocarpus* (Ell.) Benth.) (*Andropogon melanocarpus* Ell., 1816.). *Heteropogon melanocarpus* (Muhl.) Coult. is based on *Stipa melanocarpa* Muhl.

Folder 265 contains *Muhlenbergia capillaris* (Lam.) Trin.

XXXVII. 1. (266). Avena spicata [L.]. Page 183. The specimens belong to this species. (=*Danthonia spicata* (L.) Beauv.).

XXXVII. 2. (267). Avena glumosa Michx. Page 184. The specimens belong to *Danthonia sericea* Nutt. *Avena glumosa* Michx. is a synonym of *Danthonia spicata.*

XXXVII. 3. (268). Avena elatior [L.]. Page 185. The specimens belong to this species. (=*Arrhenatherum elatius* (L.) Mert. & Koch).

[9] See Types of American Grasses, Contr. U. S. Nat. Herb. 12: 123. 1908.

XXXVII. 4. (269). AVENA PENNSYLVANICA [L.]. Page 185. The specimens belong to this species. (=*Trisetum pennsylvanicum* (L.) Beauv.).

XXXVII. 5. AVENA PALUSTRIS Michx. Page 186. There is no folder for this. Michaux's species is the same as *Trisetum pennsylvanicum* (L.) Beauv. (See preceding species).

Folder 270 contains a mixture of *Calamagrostis canadensis* (Michx.) Beauv. and *C. inexpansa* Gray.

XXXIII. 1. (271). ARUNDO CINNOIDES [Muhl.]. Page 187. The specimens belong to this species. (=*Calamagrostis cinnoides* (Muhl.) Barton).

XXXVIII. 2. (272). ARUNDO ARENARIA [L.]. Page 188. The specimens belong to *Ammophila breviligulata* Fernald. The European species, *A. arenaria* (L.) Link (based on *Arundo arenaria* L.), to which the American species has been until recently referred, has a long ligule.

XXXVIII. 3. (273). ARUNDO PHRAGMITES [L.]. Page 188. The specimens belong to this species. (=*Phragmites communis* Trin.).

XXXVIII. 3. ARUNDO EPIGEJOS ? [L.]. Page 189. There is no folder for this. It is a European species (*Calamagrostis epigeios* (L.) Roth). Possibly folder 270 goes with Arundo no. 3.

XXXVIII. 4. (274). ARUNDO DONAX [L.]. Page 190. The specimens belong to this species.

Folder 275 is empty.

XXXIX. (276). ARUNDINARIA TECTA [(Walt.) Muhl.]. Page 191. The specimens belong to *Arundinaria* and probably to *A. tecta*. It is difficult to distinguish between this and *A. gigantea* (Walt.) Chapm. (*A. macrosperma* Michx.) in herbarium specimens. The description states that the plant is suffrutescent which applies to *A. tecta*, the species of the Coastal Plain as far north as Maryland.

XL. 1. (277). ERIANTHUS GIGANTEUS [Muhl.]. Page 192. Most of the specimens belong to *E. alopecuroides* (L.) Ell. (*E. divaricatus* (L.) Hitchc.), but there is one panicle of *E. saccharoides* intermixed. The name was first published as *E. giganteus* Muhl. Cat. Pl. 4. 1813, based on *Anthoxanthum giganteum* Walt., which is *Erianthus saccharoides* Michx. Muhlenberg's description (awn twisted) in the "Descriptio" applies to *E. alopecuroides*, the awn of *E. saccharoides* being straight.

XL. 2. (278). ERIANTHUS BREVIBARBIS [Michx.]. Page 193. The specimens belong to *E. strictus* Baldw., a distinct species.

XLI. (279). HORDEUM JUBATUM [L.]. Page 194. The specimens belong to this species.

Folder 280 contains *Hordeum pusillum* Nutt., which is not included in the "Descriptio." The folder is listed under an unpublished name.

XLII. 1. (281). TRITICUM REPENS [L.]. Page 195. The specimens belong to this species. (= *Agropyron repens* (L.) Beauv.).

XLII. 2. (283). TRITICUM CANINUM [L.]. Page 196. The specimen consists of a spike and a leaf with a few short hairs on the upper surface of the blade. It appears to be *Agropyron repens* and not *A. caninum* (L.) Beauv., based on *Triticum caninum* L.

XLIII. (282). LOLIUM PERENNE [L.]. Page 196. Most of the specimens belong to this species. *Agropyron repens* is intermixed.

XLIV. (284). ROTTBOELLIA DIMIDIATA [L. f.]. Page 197. The specimens belong to *Stenotaphrum secundatum* (Walt.) Kuntze. *Rottboellia dimidiata* is an Asiatic species, now called *Stenotaphrum dimidiatum* (L. f.) Brongn.

Genus XLV is *Juncus*.

XLVI. (285). ORYZA SATIVA [L.]. Page 211. The specimens belong to this species.

Genera XLVII and XLVIII are *Typha* and *Sparganium*.

XLIX. ZEA MAYS [L.]. Page 214. There is no specimen of this.

L. 1. TRIPSACUM DACTYLOIDES [L.]. Page 215. There is a specimen of this among the foreign grasses in a folder marked 369.

LI. 1. COIX LACRYMA [–JOBI L.]. Page 216. There is a specimen of this in folder 264 among the Junci.

Genera LII and LIII are *Carex* and *Scleria*.

LIV. 1. (385). ZIZANIA CLAVULOSA [Michx.]. Page 270. The specimens belong to this species. (= *Z. aquatica* L.) One specimen is labeled "aquatica an clavulosa." The others are not labeled and may represent Muhlenberg's *Z. palustris*.

LIV. 2. (386). ZIZANIA PALUSTRIS L. Page 271. The folder is empty. The species is the same as *Z. aquatica* L. (See preceding number).

LV. 1. (387). HOLCUS ODORATUS [L.]. Page 273. The plants belong to this species. (= *Hierochloe odorata* (L.) Beauv.).

LV. 2. (388). HOLCUS LANATUS [L.]. Page 274. The specimens belong to this species.

LV. 3. (389). HOLCUS SACCHARATUS [L.]. Page 275. The specimen is a cultivated form of *Sorghum vulgare* Pers. with loose panicle.

LV. 4. (390). HOLCUS CERNUUS [Muhl.]. Page 276. The specimen is a cultivated form of *Sorghum vulgare* Pers. with a compact erect panicle.

Folder 392, listed as *Chloris mucronata,* contains *Dactyloctenium aegyptium* (L.) Richt.

LVI. 1. (401). ANDROPOGON VIRGINICUS [L.]. Page 277. The specimens belong to this species.

LVI. 2. (402). ANDROPOGON GLAUCUS [Muhl.]. Page 278. The specimens belong to this species. (= *A. capillipes* Nash). *A. glaucus* Muhl. is invalidated by *A. glaucus* Retz. (1789).

LVI. 3. (403). ANDROPOGON MACROUROS [Michx.]. Page 278. Most of the specimens belong to this species. (= *A. glomeratus* (Walt.) B. S. P.). Intermixed are *A. elliottii* Chapm., *A. longiberbis* Hack., and *A. virginicus* L.

LVI. 4. (404). ANDROPOGON [without specific name]. Page 279. This folder is empty. *A. muhlenbergianus* Schult. (Mant. 2: 455. 1824) is based on this, which appears to be *A. ternarius* Michx., to which it is referred by Hackel (Monog. Phan. 6: 423. 1889).

LVI. 5. (405). ANDROPOGON TERNARIUS [Michx.]. Page 280. Most of the specimens belong to this species. Intermixed is *A. elliottii* Chapm.

LVI. 6. (414). ANDROPOGON FURCATUS [Muhl.]. Page 281. The specimens belong to this species.

LVI. 7. (407). ANDROPOGON PURPURASCENS [Muhl.]. Page 282. The specimens belong to this species. (= *A. scoparius* Michx.).

LVI. 8. (409). ANDROPOGON ALOPECUROIDES [L.]. Page 283. The specimens belong to *Erianthus saccharoides* Michx. *Andropogon alopecuroides* is *Erianthus alopecuroides* (L.) Ell.

LVI. 9. (410). ANDROPOGON NUTANS [L.]. Page 284. The specimens belong to this species. (= *Sorghastrum nutans* (L.) Nash).

LVI. 10. (412). Andropogon ambiguus [Michx.]. Page 285. The specimens belong to this species. (= *Gymnopogon ambiguus* (Michx.) B. S. P.).

Folder 408 contains a slender culm with lateral inflorescences much reduced by disease. It may be *Andropogon scoparius* Michx.

Folder 411 contains *Sorghastrum nutans* (L.) Nash.

Folder 413 contains *Erianthus brevibarbis* Michx.

Folder 425 contains a fragment of *Andropogon virginicus* L.

LVII. 1. (391). Chloris monostachya [Michx.]. Page 286. The specimens belong to this species. (= *Ctenium aromaticum* (Walt.) Wood).

LVII. 2. (393). Chloris petraea [Swartz]. Page 286. The specimens belong to this species.

LVIII. (394). Atheropogon apludoides [Muhl.]. Page 287. The specimens belong to this species. (= *Bouteloua curtipendula* (Michx.) Torr.) Muhlenberg's name was first published by Willdenow (Muhl.; Willd. Sp. Pl. 4: 937. 1806).

U. S. Department of Agriculture.

William Trimble (1847–1932)

Samuel and William Trimble belonged to the tradition that half a century earlier had produced Minshall and Jacob Painter, the founders of Painters' Arboretum and the formulators of "a circle of universal knowledge." They were of a generation of Friends to whom fiction and art were unknown, but who with the more intensity followed history, mathematics, and science. Also, so like others of the same tradition, little of their extensive store of knowledge was ever placed upon permanent record.

Dr. Samuel Trimble, for many years physician at Lima, Pennsylvania, knew the wild life, and especially the plants, over the wide portion of Delaware County that he traveled by horse and buggy; and moreover he knew the history of this section of territory from the days of its settlement. He was keenly observant and a remarkable narrator. From my childhood I recall the delight of the Doctor's visits to our household, and I suspect that it was due to his constant interest and his frequent suggestions of good hunting-grounds and trophies that my boyhood zeal for seeking plants never flagged. About 1905 he retired from practice and moved to a farm along Crum Creek near Newtown Square; then it became amazing to note how many choice plants were promptly discovered thereon. Indeed, I wonder if I have seen the large yellow *Cypripedium* in our home area since Dr. Trimble showed it to me on his farm twenty years ago. Fortunately many of his finds through Delaware County have been entered in Keller and Brown's "Handbook of the Flora of Philadelphia and Vicinity."

Dr. Trimble died in 1919 at seventy-six years of age, and now we must record the death of William Trimble in his eighty-fifth year. The latter was born August 19, 1847, and died March 31, 1932. William was four years the younger, and most of his life was passed as a farmer near Concordville, Delaware County, Pennsylvania. Less versatile than his brother, he followed botany more intensively and amassed a considerable herbarium. Around his home also choice plants seemed to flourish, and his records are likewise included in Keller and Brown's "Handbook." To some extent he continued the mycological interest of his uncle, Dr. George Martin, whose large series of Fungi is in the Academy's Herbarium.

So far as has been discovered the only botanical papers by William Trimble are a few notes in early volumes of the *Bulletin* of the Torrey Botanical Club; these are "Teratological Notes" in vol. 9: 10–11. 1882, "Teratological and other Notes" in vol. 9: 140–141. 1882, and notes on *Aristolochia clematitis* and *Melia azedarach* in vol. 18: 87. 1891.

During the last years of his life William Trimble lived in West Chester. There he loved to tramp through the woodlands known to Darlington a century ago. Indeed, until nearly the close of his life he was always ready for trips afield. Though of spare figure, he could outwalk many a younger botanist, and his sight was still keen.

William Trimble's herbarium was presented to the Academy of Natural Sciences in 1928 (as noted in BARTONIA 10: 57. 1929), and it has much enriched our series of plants from Delaware and Chester counties, Pennsylvania.

Yet another brother of this family was Henry Trimble (1853–1898), Professor in the Philadelphia College of Pharmacy, who contributed to botanical and chemical literature a two-volumed study of "The Tannins" (1892–1894).

F. W. P.

Hugo Bilgram (1847–1932)

Hugo Bilgram, born in the town of Memmingen in Bavaria, arrived in America in 1869. In Philadelphia he found friends, among whom were Professor John M. Maisch, Pharmacologist, and Joseph Zentmayer, maker of microscopes. With Zentmayer, there was occupation congenial with the strong bent toward craftmanship in metals which later was to make him renowned as a master of the theory and the art of gear-cutting. Here he remained for several years, and here he became interested in the microscope and its revelations. About the year 1879 he founded a machine shop of his own, and the use of his lathes and other appliances was freely offered to Mr. Zentmayer. In return, he was presented with a fine microscope of the well-known Zentmayer type. This was in the year 1881. From that time he became an addict, and in due course an expert in minute manipulations.

Always a lover of nature, Mr. Bilgram began in the early eighties definitely to specialize on Myxomycetes. Dr. George A. Rex and Mr. Harold Wingate seem to have been influential in fixing him in this course of study. It would appear that by the year 1890 he was in full swing; and that, in addition to making innumerable gatherings of fine material in the neighborhood of Philadelphia, he had entered widely into correspondence and exchange of specimens with other students of these forms. We find the names of Prof. T. H. Macbride, Arthur Lister, Prof. Sturgis, Dr. Jahn, and Prof. Beardslee, among those from whom he obtained much valuable material.

Mr. Bilgram became an active member of the Biological and Microscopical Section of the Academy of Natural Sciences, and ultimately of its successor, the Leidy Microscopical Club. His long experience, extending in all over almost half a century, made his communications of extraordinary interest and of an authoritative character. It was due to him that the collection and study of the Myxomycetes was taken up by a number of microscopists in Philadelphia. Among these may be mentioned F. J. Keeley, Wm. B. Davis, W. H. Van Sickel, Mrs. W. Hersey Thomas, and Geo. L. Pennock. I have the honor to be of the same company.

Mr. Bilgram was the author of the species *Diachaea cylindrica*[1] and joint author (with Sturgis) of the beautiful *Physarum lilacinum.*[2] Both are extremely rare. His tireless search for specimens in Fairmount Park and the Wissahickon, in Delaware, Bucks and Montgomery counties, Pennsylvania, and elsewhere, brought to light numerous little-known species, and added greatly to our knowledge of range and variation. Among the local discoveries was that of the nearly invisible *Echinostelium minutum.* This had never been found before in America, except once in some laboratory material in the Gray Herbarium; and elsewhere it was on record only once from Frankfort-am-Main, and once in each case from England and Austria. And even when the disabilities of age came upon him, he was able, in 1926, to find beside his doorstep in Moylan the elusive *Physarum gyrosum.* This is nearly a new record; in fact it was the first record of undoubted authenticity for America, and only duplicated in 1928 by that of Mrs. Thomas for the same neighborhood. He was generous with duplicate material, courteous and painstaking in the identification of specimens. In this direction, nothing was a trouble to him, and his uniform kindliness will always be remembered.

The collection of specimens left by Mr. Bilgram is in some ways unique. It is in two parts. The first consists of a long series of mounts of sporangia, spores and capillitium in glycerine jelly, illustrative of generic and specific characters. This is contained in the usual slide boxes. They constitute a valuable aid in the technical study of the Myxomycetes. The second part is in ten containers, each holding 36 boxes of uniform size set on end and numbered from 1 to 360. The boxes themselves, and the contained specimens, are the last word in

[1] Proc. Acad. Nat. Sci. Phila. 57: 524. 1905.

[2] Mycologia 9: 324. 1912.

neatness and system. In many instances the boxes are clothed within, as to bottom, sides and lid, with a rich variety of forms of the same species. In others, more than one species is in the same box, and in many cases this facilitates a critical comparison of related forms. Each specimen is numbered, and the number is a reference to a card catalogue. Mr. Bilgram's manual deftness, ingenious economy of space, and sense of form are everywhere in evidence.

The card catalogue is a rare example of what a card catalogue should be. First of all, there are cards numbered to correspond with the boxes, and each card gives the contents of that particular box, together with such data as seemed essential. Next following is a series of cards forming an alphabetical index of genera, each with list of species of the particular genus, and the numbers of all boxes containing them. Then there is a series of "Notable Forms," such as "Iridescent" or "Deficient in Lime," or specialties like "Twins," "Duplicate Abnormalities"; curious categories, such as "Growing on Spider Web," or on "Snail Shell," etc., etc. A fourth series gives localities by states and foreign countries, and a fifth refers by number to boxes containing specimens accredited to correspondents and local students and collectors. All this in a penmanship the near equivalent of copperplate.

Here, then, is the physical evidence of Mr. Bilgram's fifty years of enthusiastic study of the Myxomycetes. Apart from the slide mounts and the diminutive card catalogue, the collection occupies less than two cubic feet of space. "Infinite riches"—one might say—"in a little room." It is condensation itself. But it is adequate and it is beautiful.

T. Chalkley Palmer

George William Bassett (1871–1932)

Frank L. and George W. Bassett, brothers, nurserymen of Hammonton, were both interested in the wild flora of southern New Jersey and ever ready to welcome botanists to their hospitable homes. The older brother, who seems never to have been a member of our Club, died over twenty years ago. About fifteen years ago George joined the government's survey of the white-pine blister-rust, then was for several years with the Hicks Nurseries on Long Island, and for the past ten years resident near Philadelphia.

From 1922 to 1928 Mr. Bassett was assistant in the Local Herbarium of the Academy of Natural Sciences. From 1904 he had been a member of our Club, and now he became intimately interested in the welfare of the Club's collections. He delighted in special methods of preparing unusual specimens, and was always ready to aid in the identification of difficult plants. Especially was his wide knowledge of cultivated plants often called into requisition.

For the last four years he had been tree-guide at Bartram's Garden, a task for which his knowledge of historical, horticultural and indigenous botany well fitted him.

Mr. Bassett was most at home in the out-of-doors, and he will be long remembered by many who made acquaintance with the "Jersey Pines" under his guidance. He welcomed our joint excursions with the Torrey Botanical Club, and many of us recall the artistic and humorous notice that bade us to Alloway over Labor Day in 1924. There was also a charm in his writing, and our newer members will do well to read the "Trials and Pleasures of the Collector" (in BARTONIA 4: 11–13. 1911), and "The Trail of the Winding Water" (in BARTONIA 5: 6–10. 1912), the latter an account of a canoe journey down the Batsto River.

Born November 1, 1871, George Bassett died August 30, 1932, in his sixty-first year. F. W. P.

Ida Augusta Keller (1866–1932)

Dr. Ida A. Keller, one of the early members of the Club, died at her summer home at Aquetong, Bucks County, Pennsylvania, on September 10, 1932.

She was elected to active membership in 1892, the year after the Club was founded, being the first, and for many years the only, woman member. She was very regular in her attendance at the early meetings, and took part in the field trips to the lower Susquahanna and to points in the Pennsylvania mountains as well as in shorter excursions near home. She served as Vice-President of the Club in 1900.

Ida A. Keller was the daughter of a Philadelphia physician and was born on June 11, 1866, at Darmstadt, Germany, while her parents were on a visit to their former home. She was educated at the University of Pennsylvania (1884–86) and at Leipzig (1887–89), and took her Ph.D. at Zurich in 1890. She was assistant in botany at Bryn Mawr College (1886–87) and later lecturer there (1891–93). She taught chemistry at the Philadelphia High School for Girls (1893–98), and was head of the Department of Science in the school from 1898 until her retirement two years ago due to failing health.

Dr. Keller became a member of the Academy of Natural Sciences in 1890, and was active in the Botanical Section which for many years held regular monthly meetings. In association with the late Stewardson Brown, Curator of Plants at the Academy, she published a "Handbook of the Philadelphia Flora," in which were brought together the records of many collectors over the territory covered by the Academy's Local Herbarium. This book was published by the Philadelphia Botanical Club in 1905.

Other botanical studies show Dr. Keller's wide interest, ranging from problems of flower-fertilization and physiology to the Alga, *Oedigonium*. These, all published in the *Proceedings* of the Academy, are:

The phenomenon of fertilization in the flowers of *Monarda fistulosa.* 42: 452–454. 1892. (Illust.)

The glandular hairs of *Brasenia peltata* Pursh. 45: 188–193. 1893. (Illust.)

The jelly-like secretion of the fruit of *Peltandra undulata* Raf. 47: 287–290. 1895. (Illust.)

Notes on the study of the cross-fertilization of flowers by insects. 47: 555–561. 1895.

The coloring matter of the aril of *Celastrus scandens.* 48: 212–218. 1896.

Notes on plant monstrosities. 49: 284–287. 1897.

Notes on underground runners. 49: 161–165. 1897. (Illust.)

The growth of *Viburnum lantanoides* Michx. 50: 482–484. 1898. (Illust.)

Notes on hyacinth roots. 52: 438–440. 1900. (Illust.)

Demonstration that plants give off oxygen. 53: 320–321. 1901.

A peculiar condition of *Oedogonium.* 52: 598–601. 1902. (Illust.)

Summer activity of some spring flowers. 56: 481–483. 1904.

Dr. Keller was an honorary member of the Pennsylvania Horticultural Society, a member of the American Association for the Advancement of Science, the American Society of Naturalists, and the Eugenics Society. She was also a member of the Association of Colleges and Preparatory Schools of the Middle States, serving as Vice-President in 1895. She was a sister of the noted chemist, the late Dr. Harry F. Keller, principal of the Germantown High School and Secretary of the American Philosophical Society.

WITMER STONE

General Notes

Darlington Sesquicentennial. In commemorating the 150th anniversary of William Darlington's birth, we are fortunate in obtaining a sketch of him from a follower and successor. Dr. William T. Sharpless has also long practiced medicine in West Chester, and he has been President of the Medical Society of the State of Pennsylvania, an office not held by a physician of Chester County since its tenure by Dr. Darlington; for years Dr. Sharpless has been keenly interested in the work of his illustrious predecessor. He is naturally most familiar with the medical and personal aspects of Darlington's work. For a closer botanical criticism of the several editions of the "Flora Cestrica," we would refer to Hugh E. Stone's "A Centennial Survey of the Chester County Flora" in BARTONIA 11: 36–41. 1929. At the time of Dr. Darlington's death sketches of his life and botanical work were prepared by Thomas P. James for the American Philosophical Society (1869) and by W. T[ownsend] (West Chester, 1863).

Flora of Bucks County. Over ten years ago Walter M. Benner commenced the collecting of data, both specimens in the field and locality records from the Club's Herbarium, for a detailed flora of Bucks County, Pennsylvania. The task has been achieved with painstaking thoroughness, and there now is appearing from the Science Press a volume of 300 pages giving a discussion of the distribution of the vegetation and listing the species with information of localities and range. While conceived independently, this work has appropriately been acknowledged by the University of Pennsylvania in fulfilment of requirements for the degree of Doctor of Philosophy.

Death of Eugene A. Rau. On October 16, 1932, the Club lost by death an Honorary Member, Mr. Eugene A. Rau, of Bethlehem, Pa. For many years he had studied and collected plants, devoting chief attention to mosses and fungi. His library and specimens have been left to the Academy. In our next issue is to be a sketch of his life and botanical work.

Programs of Meetings during 1931

Date	Subject	Speaker	Attendance
Jan. 22	Flora of the Pocono Lake Region	J. Fletcher Street	31
Feb. 26	Collecting Ferns in Mexico	Arthur N. Leeds	29
Mar. 26	Some of the more recent Additions to the Local Flora	Bayard Long	31
Apr. 23	Collecting Ferns in Florida	Dr. Edgar T. Wherry	
	Local Species of *Salix*	Bayard Long	28
May 28	Medicinal Properties of Local Plants	Dr. Marin Dunn	
	Local Species of *Hicoria*	J. Fletcher Street	29
Sept. 24	Reports of Summer Work by Members		18
Oct. 22	Down the Mackenzie to the Arctic	Dr. Roland Holroyd	
	Eastern Species of *Penstemon*	Dr. F. W. Pennell	39
Nov. 19	Riddles of the Woods	Reginald D. Forbes	26
Dec. 17	The 1929 Expedition to Newfoundland	Dr. John M. Fogg, Jr.	34

Officers and Members of the Philadelphia Botanical Club, 1932

DR. EDGAR T. WHERRY, *President*
HARRY W. TRUDELL, *Vice-President*
ROBERT R. TATNALL, *Secretary*
ARTHUR N. LEEDS, *Treasurer*
BAYARD LONG, *Curator*

ACTIVE MEMBERS

	Elected
Joseph W. Adams, 108 W. Wishart St., Philadelphia	1925
A. G. Alderfer, Sellersville, Pa.	1932
Wharton B. Aucott, 746 Tyson Ave., Ardsley, Pa.	1928
Edwin B. Bartram, Bushkill, Pa.	1906
J. Russell Bebler, 135 E. Phil Ellena St., Germantown, Phila.	1919
Don M. Benedict, Temple University, Philadelphia	1932
Walter M. Benner, 5636 Loretta Ave., Frankford, Phila.	1912
Carl E. Bliss, 65 Randolph Place, South Orange, N. J.	1924
Carl Boyer, Wagner Institute, 17th St. & Montgomery Ave., Phila.	1926
J. Claudius Boyle, 223 Kenmore Road, Brookline, Pa.	1919
Dr. Herman A. Burgin, 212 High St., Germantown, Phila.	1915
Milton Campbell, 4401 Pine St., Philadelphia	1928
Prof. M. A. Chrysler, Rutgers University, New Brunswick, N. J.	1931
F. Van Buren Connell, 500 Homewood Ave., Narberth, Pa.	1924
Joseph Crawford, 16 E. Stewart Ave., Lansdowne, Pa.	Founder
Dr. Herbert J. Darmstadter, 4617 York Road, Philadelphia	1926
Robert R. Dreisbach, 410 Jerome St., Midland, Mich.	1922
L. J. Duersmith, 572 Walnut St., Columbia, Pa.	1931
Dr. John W. Eckfeldt, 502 Kathmere Road, Brookline, Pa.	1892
Howard W. Elkinton, 6514 Germantown Ave., Philadelphia	1931
Mrs. Harold Evans, Awbury, E. Washington Lane, Germantown, Philadelphia	1931
Richard Blossom Farley, 1520 Chestnut St., Philadelphia	1931
Dr. John M. Fogg, Jr., University of Pennsylvania, Philadelphia	1921
Arthur M. Henry, U. S. Appraisers Stores, 134 S. 2nd St., Phila.	1927
Howard K. Henry, 1464 Grayton St., Penn Wynne, Pa.	1932
Mrs. J. Norman Henry, Gladwyne, Pa.	1932
Frederick J. Hermann, Temple University, Philadelphia	1932
F. F. Huber, Pennsburg, Pa.	1911
Miss Clara Kast, 2004 Spring Garden St., Philadelphia	1932
William R. Keeney, 318 E. Lancaster Ave., Wayne, Pa.	1930
Dr. Edward I. Keffer, 5971 Drexel Road, Philadelphia	1932

Addison D. Kern, 222 W. Linton St., Philadelphia	1929
Miss Natalie B. Kimber, 538 E. Locust Ave., Germantown, Pa.	1928
Rev. William U. Kistler, 118 Main St., Pennsburg, Pa.	1911
Prof. W. A. Kline, Ursinus College, Collegeville, Pa.	1911
Charles E. Knopf, 6129 N. Franklin St., Philadelphia	1931
Albert Middleton Laessle, 511 Runnymede Ave., Jenkintown, Pa.	1932
Dr. Henry A. Laessle, 5900 Market St., Philadelphia	1894
Dr. H. Pearce Lakin, 14 E. Main St., Lansdale, Pa.	1906
Dr. Charles H. La Wall, 214 S. 12th St., Philadelphia	1896
Arthur N. Leeds, 5321 Baynton St., Germantown, Phila.	Founder
Morris E. Leeds, 5321 Baynton St., Germantown, Phila.	Founder
Mrs. Paul Lewis, Strafford, Pa.	1932
Dr. Harry A. Lloyd, 200 N. 35th St., Philadelphia	1931
Bayard Long, 250 Ashbourne Road, Elkins Park, Pa.	1906
Mayne Reid Longstreth, 1420 Chestnut St., Philadelphia	1892
Frederick McDowell, 4840 Roosevelt Boulevard, Philadelphia	1930
Rogers McVaugh, 4111 Baltimore Ave., Philadelphia	1930
Adolf Müller, Box 66, Norristown, Pa.	1920
G. G. Nearing, Guyencourt, Del.	1932
Dr. Samuel C. Palmer, 612 Ogden Ave., Swarthmore, Pa.	1929
T. Chalkley Palmer, Media, Pa.	1927
Dr. Gideon H. Patton, 61 E. Penn St., Germantown, Phila.	1929
Dr. Francis W. Pennell, Moylan, Pa.	1910
Edward Pennock, 3609 Woodland Ave., Philadelphia	1891
Harold W. Pretz, 123 S. 17th St., Allentown, Pa.	1909
John W. Prince, 5439 Berks St., Philadelphia	1924
Evan Randolph, Seminole & Chestnut Aves., Chestnut Hill, Phila.	1917
George Redles, 207 E. Wister St., Germantown, Phila.	1917
Dr. W. H. Reed, Jeffersonville, Pa.	1892
Charles C. Roberts, 75 W. Lacrosse Ave., Lansdowne, Pa.	1926
Lee Sowden, 3823 Oak Road, Germantown, Phila.	1901
Dr. D. Walter Steckbeck, University of Pennsylvania, Phila.	1925
Hugh E. Stone, Haverford, Pa.	1892
Dr. Witmer Stone, Academy of Natural Sciences, Philadelphia	Founder
J. Fletcher Street, 1120 Locust St., Philadelphia	1918
Dr. Robert R. Tatnall, 1100 W. 10th St., Wilmington, Del.	1928
Arthur H. Thomas, Haverford, Pa.	1928
Mrs. W. Hersey Thomas, 145 E. Gorgas Lane, Mt. Airy, Phila.	1929
Horace E. Thompson, 5016 Schuyler St., Germantown, Phila.	1920
Harry W. Trudell, 2030 E. Madison St., Philadelphia	1915
Prof. Rodney H. True, University of Pennsylvania, Philadelphia	1925
Clarence E. Varnum, Atco, N. J.	1922
Robert F. Welsh, 132 S. 4th St., Philadelphia	1909
Dr. Edgar T. Wherry, University of Pennsylvania, Philadelphia	1925

Edward J. White, 7124 Cresheim Road, Mt. Airy, Phila.	1931
Dr. Edward E. Wildman, 4331 Osage Ave., Philadelphia	1931
Hans Wilkens, 241 S. 11th St., Reading, Pa.	1928
William H. Witte, 16 York St., Camden, N. J.	1898
Miss Mary F. Wright, Boxwood Farm, Ambler, Pa.	1928

HONORARY MEMBERS

Samuel Newman Baxter, Fernhill Farm, Germantown, Phila.	*1918
Dr. Joseph S. Illick, Mont Alto, Pa.	1925
Samuel S. Van Pelt, 59 Bethlehem Pike, Chestnut Hill, Phila.	*1902

CORRESPONDING MEMBERS

Charles C. Bachman, Slatington, Pa.	1908
Mrs. Elizabeth G. Britton, N. Y. Botanical Garden, New York City	1895
Dr. Nathaniel Lord Britton, N. Y. Botanical Garden, N. Y. City	1892
Otway H. Brown, 1048 Washington St., Cape May, N. J.	1908
Stewart H. Burnham, Cornell University, Ithaca, N. Y.	1911
Prof. M. L. Fernald, Gray Herbarium, Harvard University, Cambridge, Mass.	1929
Dr. A. Arthur Heller, Chico, Calif.	1893
Dr. Harold St. John, University of Hawaii, Honolulu, T. H.	1927
Charles F. Saunders, Pasadena, Calif.	*1893
Dr. John K. Small, New York Botanical Garden, New York City	1893
Dr. William Randolph Taylor, University of Michigan, Ann Arbor, Mich.	*1921
Dr. Campbell E. Waters, Washington, D. C.	1904
Dr. H. W. Youngken, Massachusetts College of Pharmacy, Boston, Mass.	*1918

RECENTLY DECEASED MEMBERS

	Died
George W. Bassett, Honorary	Aug. 30, 1932
Dr. Ida A. Keller, Active	Sept. 11, 1932
Eugene A. Rau, Honorary	Oct. 16, 1932
Warner R. Thomas, Active	1930

* Elected Active Members on these dates.

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No. 15 1933

BARTONIA

PROCEEDINGS OF THE
PHILADELPHIA BOTANICAL CLUB

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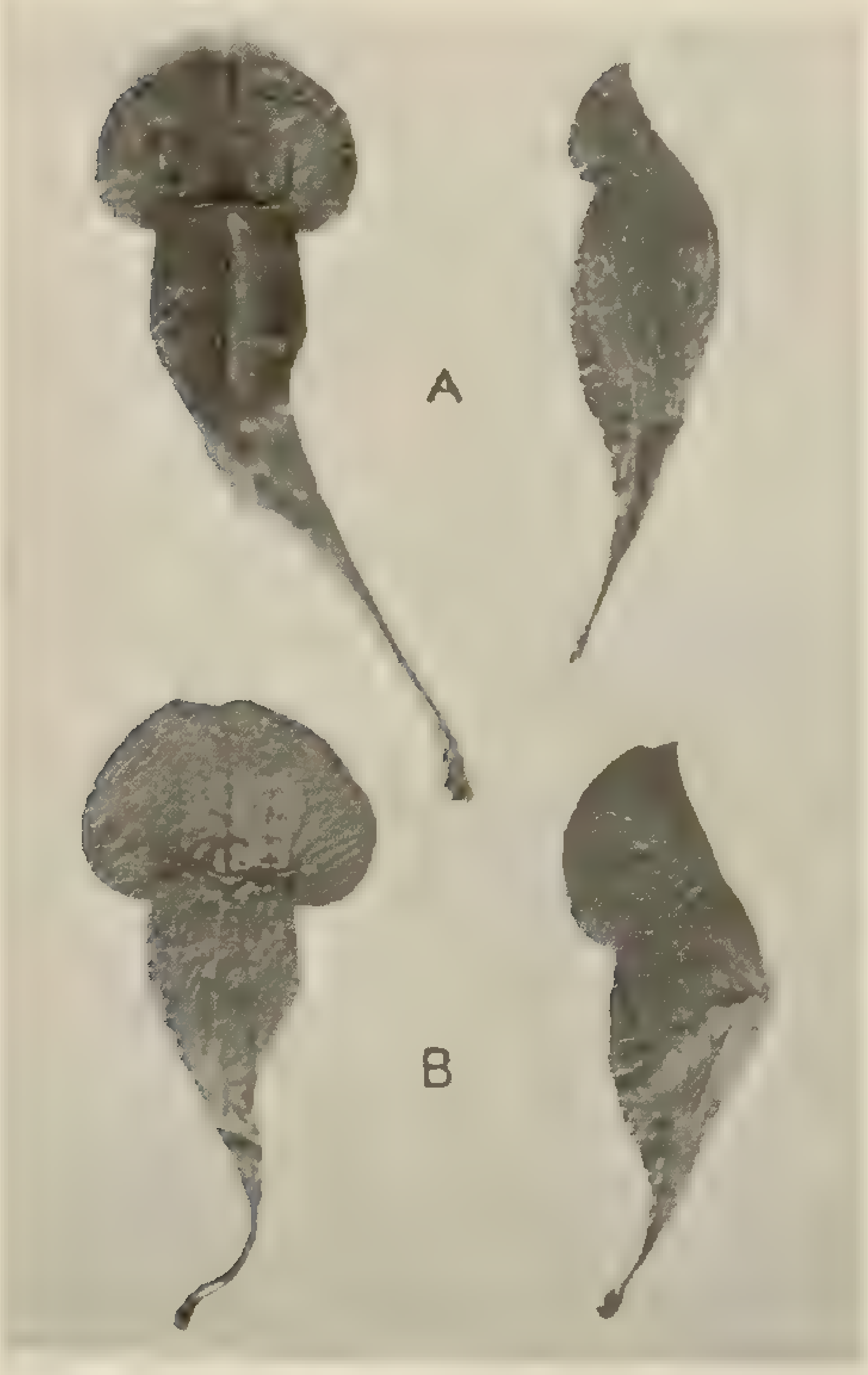

FIG. 1. *Sarracenia purpurea.*
A, *gibbosa*; B, *venosa.*

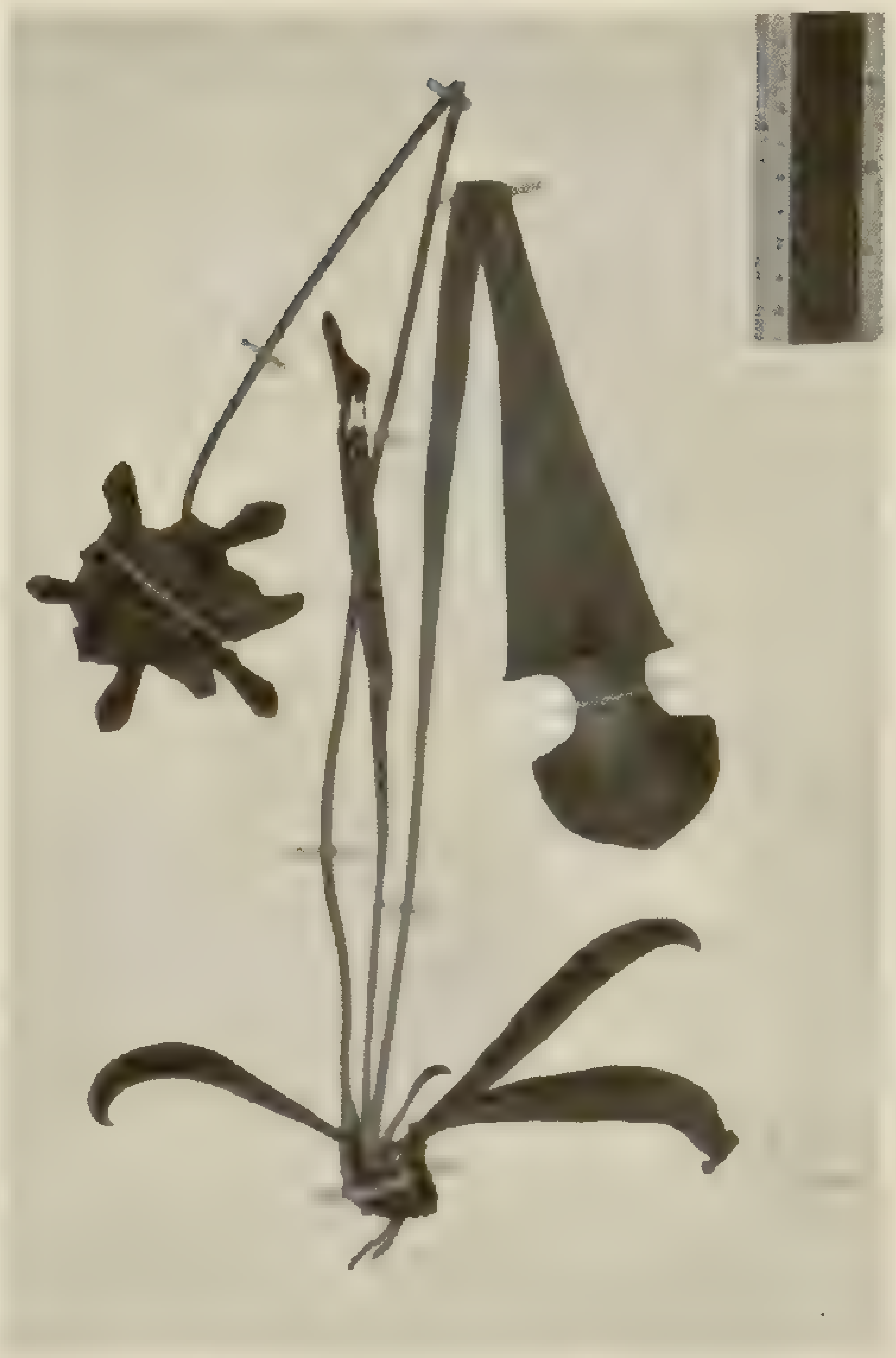

FIG. 2. *Sarracenia oreophila.*
Type specimen.

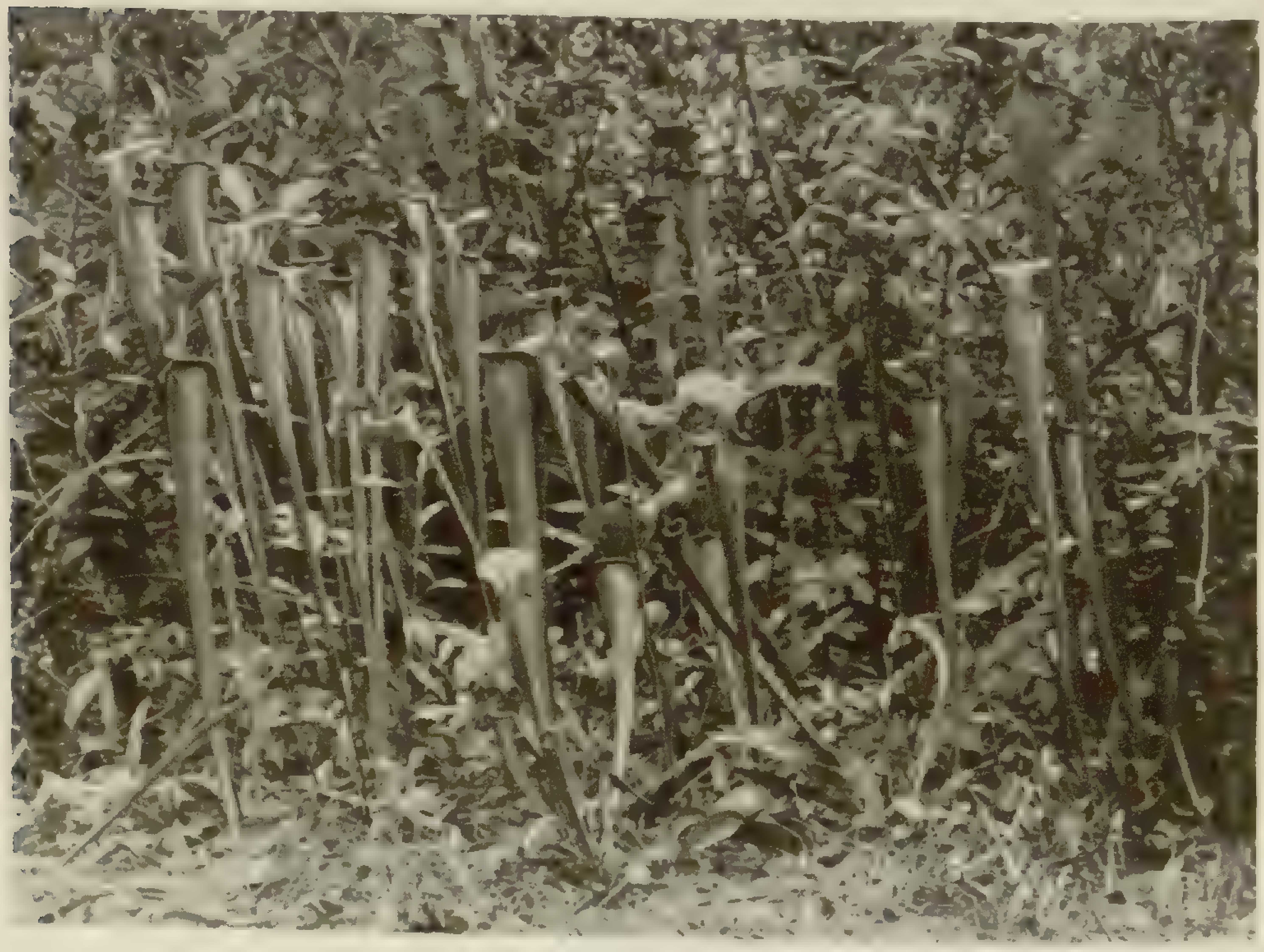

FIG. 3. *Sarracenia oreophila.*
Flat Rock, Jackson County, Alabama, June 11, 1933.

BARTONIA

PROCEEDINGS OF THE PHILADELPHIA BOTANICAL CLUB

No. 15 PHILADELPHIA, PA. 1933

The Geographic Relations of Sarracenia purpurea[1]

EDGAR T. WHERRY

Early in 1931 there appeared in a German serial[2] a set of maps purporting to show the distribution of the species of *Sarracenia.* These maps indicated the ranges as extending in some directions many miles beyond any localities cited in the trustworthy literature on these plants, and in other directions not including nearly all the territory covered by definite records. *Sarracenia purpurea* is shown as occurring in Kentucky, West Virginia, and upland Virginia, and as abundant in Tennessee, although as had been pointed out by Harper[3] "no botanist now living seems to have seen it in those states," and no specimens from them are included in the principal herbaria of this country. At the same time, southern New Jersey is excluded from the range, in spite of the fact that Macfarlane[4] cited twelve and Stone[5] twenty-four collections.

The map presented herewith is based on the records obtained from seven comprehensive herbaria: Academy of Natural Sciences of Philadelphia, Canadian National Herbarium, Cornell University, Gray Herbarium, New York Botanical Garden, U. S. National Herbarium, and University of Pennsylvania, the last including the material collected by Macfarlane in the preparation of his monograph on the *Sarraceniaceae.* The literature has also been reviewed.

---

[1] Contribution from the Botanical Laboratory and Morris Arboretum of the University of Pennsylvania.

[2] Die Pflanzenareale, Ser. 3, No. 1, maps 1 to 3. 1931.

[3] Journ. Elisha Mitchell Sci. Soc. 34: 115. 1918.

[4] Sarraceniaceae, in Engler's Pflanzenreich IV. 110: 33. 1908.

[5] Plants of Southern New Jersey: 467. 1911.

Sarracenia purpurea Linné is not altogether constant in its characters throughout its range, and three attempts have been made to subdivide it. In 1822 Eaton[1] described under the name *S. heterophylla* a plant from Massachusetts, characterized as slender and yellowish throughout, and as having the outer leaves longer than the inner ones. He considered this "a remarkably distinct species," but field study indicates that slender habit and elongated outer leaves represent merely the result of growing in the shade, leaving only the color as a distinctive feature. Eaton's species has accordingly been reduced in status by later workers, Torrey[2] making it a variety, and Fernald[3] a form. In 1929 the writer[4] termed it "mutation *heterophylla,*" but has subsequently come to the view that descriptive vernacular phrases are preferable to technical designations for such plants. Accordingly, when leaf-outline is under consideration, it may be called "a slender-leaved ecad," while when attention is being paid to the coloration, it should be classed as "an anthocyan-free mutation."

The other two articles on this subject have been overlooked by most subsequent writers. The first was the characterization of a Newfoundland plant by La Pylaie[5] as follows:

> "β. Terrae-Novae, N. Phyllodiis brevioribus, fauce venis ramosis anastomosantibus vividè sanguineis; petalis minus spathulato-dilatatis, stigmatis angulis parum productis, non bifidis."

Such features as short leaves, prominent red veining, and narrowed petals are apparently of ecological origin, developing throughout the range in plants which grow high up on sphagnum hummocks or in marly depressions where nutrient elements are relatively unavailable. As to the stigma-characters, Newfoundland and east-Canadian material preserved in herbaria shows gradation from a condition where the sinuses between the projections are nearly filled with tissue, as in La Pylaie's specimen, to one where these sinuses reach nearly to the stalk, yielding a five-pointed star. Should one extreme in this series receive a varietal name, the opposite extreme as well as various intermediates would also require naming. Until some one has the opportunity to work out the significance of these variations, it seems undesirable to burden the literature with such a series of names.

---

[1] Manual of Botany, ed. 3: 447. 1822.
[2] Rept. Bot. Dept. Survey N. Y. Assembly No. 50: 120. 1839.
[3] Rhodora 24: 174. 1922.
[4] Journ. Wash. Acad. Sci. 19: 382. 1929.
[5] Mem. soc. linn. Paris 6: 389, *pl. 13.* 1827.

Being in spite of his eccentricities a keen observer, Rafinesque[1] divided the Linnean species geographically:

> "261, SARAZINA *gibbosa* Raf. (vel grandiflora) purpurea L. non omnis —several sp. or var. are blended in this remarkable plant, difficult to characterize and none are really purple—fol. conformis subsessilib. obovato gibbosis, lutescens, ala ampla gibbosa, appendice renif. setis retrorsis, scapis flexuosis, cal. obt. vel retusis, petalis spatulatis—Canada to Virginia, swamps. . . .
>
> "263, *Saraz. venosa* Raf. differs from gibbosa, by leaves short with small wings, venose reticulate of red chiefly in the lid, scape streight flowers smaller—Virg. ad Florida."

Field and herbarium study have shown that there really are foliage differences between average northern and southern material of *S. purpurea,* although ecads and other variants of either one may simulate the features of the other, so that separation into independent species is scarcely justified. The areas occupied by the two being, however, distinct, they are here classed as subspecies.

Sarracenia purpurea venosa (Raf.) Wherry, status novus.

Plate 1, fig. 1B.

Of the differentiating characters given by Rafinesque for his "*Sarazina venosa*" only the first, the leaf-length is really valid, as in both northern and southern plants the veining, length of scape, and size of flower vary in relation to state of nutrition. The leaves of the southern one are characteristically covered with bristly hairs on the exterior surface, and are short and broad in outline, the hollow part averaging less than three times as long as wide. The hood above their orifice is relatively large, and its wings (when the leaf is laterally flattened on a herbarium sheet) may extend well beyond the lip of the hollow part. This type of leaf was figured by two pre-Linnean writers, Plukenet,[2] who termed the plant

---

[1] Autikon Botanikon: 33. 1840.

[2] Amalth. Bot.: 46, *pl. 376, fig. 6.* 1705.

"*Bucanephyllon americanum*" and Catesby,[1] who described it as "*Sarracena foliis brevioribus.*" When growing in especially wet places, the leaves tend to elongate and the hood to decrease in size, thereby approaching the northern segregate in aspect, and decision as to which is represented by isolated herbarium specimens is sometimes difficult.

Sarracenia purpurea venosa is fairly common along the Gulf Coastal Plain from eastern Louisiana to western Florida, and rare in Georgia and South Carolina. It reaches its maximum development in North Carolina, growing not only in the lower country but also up to an elevation of at least 3,500 feet in the Blue Ridge. In Virginia, on the other hand, it is apparently absent from the uplands, and there are authentic records from but three lowland counties, although it is abundant enough around Richmond to be offered for sale along the streets. Skipping northeastern Virginia, Maryland, and Delaware, it appears again in southern New Jersey, intergradation with the northern segregate being there especially frequent. Migration to this isolated area presumably took place during late Tertiary or early Glacial times, over a strip of Coastal Plain which has subsequently sunk beneath the sea.

No anthocyan-free mutation has been observed in the southern segregate, but there is a beautiful color-form connected with partial loss of plastids from the flower, resulting in the sepals becoming pale green, the style-umbrella white, and the petals rose-pink instead of the usual deep red. This was discovered by Dr. Frank Morton Jones near Theodore, Alabama, in 1910, but has apparently never been recorded in print. In the course of an expedition for the collecting of pitcher-plants undertaken by the writer during July, 1932, at the instance of Mr. Louis Burk, of Philadelphia, three small clumps of this plant were obtained, and the following Spring these flowered in the greenhouses at Latham Park. No technical form-name will be given to this, as when being discussed from the scientific standpoint it can be referred to as a pallid mutation; in cultivation, however, it may well be known as *Sarracenia purpurea venosa*, horticultural variety Louis Burk.

---

[1] Nat. Hist. Carolina, etc. 2: 70. 1731.

Sarracenia purpurea gibbosa (Raf.) Wherry, status novus.

Plate 1, fig. 1A.

In contrast to the leaves of the southern plant, those of the northern one are only exceptionally bristly on the outside, and are normally long and narrow, the hollow part averaging over three times as long as wide. The hood is smaller, and its wings, when laterally flattened, extend little if at all beyond the pitcher-lip. The earliest known figure of any *Sarracenia*, that published by Clusius[1] in 1601, showed a leaf of this type, so must have represented a northern occurrence. Here also ecological conditions may lead to variation, and in unfavorable situations the leaves of the northern segregate tend to become shorter and to resemble those of the southern one.

Unlike most northern plants, this *Sarracenia* did not survive the Glacial epoch in the southern Alleghenies, but on the Coastal Plain and Piedmont of the middle Atlantic states, for it occurs well south of the ice limit only in the District of Columbia, northeastern Maryland, and Delaware. After the ice retreated it spread rapidly into the boggy areas which developed in the north, reaching Newfoundland, Lake Melville and East Main River, Labrador,[2] Athabasca River valley,[3] and Fort Chipewyan, according to a citation by Macfarlane.[4] Its northwestern limits are still uncertain; Hooker[5] reported it to occur on Bear Lake, and several compilers of manuals and floras have attributed it to the Canadian Rocky Mountains, but no specimens from these regions are extant.

The two subspecies may be keyed out as follows:

Leaves externally densely hirsute or rarely glabrous, tending to be short and broad, the hollow part averaging less than three times as long as wide; hood relatively large, its wings, when laterally flattened, often extending well beyond the pitcher-lip; petals rather light red, or pink in a mutant .... *S. p. venosa*

Leaves externally glabrous or rarely sparingly hirsute, tending to be long and narrow, the hollow part averaging over three times as long as wide; hood relatively small, its wings, when laterally flattened, extending little if at all beyond the pitcher-lip; petals intense red, or yellow in a mutant .... *S. p. gibbosa*

---

[1] Hist. Plant. Rar.: lxxxij. 1601.

[2] Geol. Surv. Canada Rept. 1895, App. vi.: 354 L.

[3] Geol. Surv. Canada Rept. 1875–76: 188.

[4] In Engler's Pflanzenreich IV. 110: 34. 1908.

[5] Flora Boreali-Americana 1: 33. 1833.

They have been seen from the following counties:

Sarracenia purpurea gibbosa (southern margin only).

Delaware: Kent, Newcastle, Sussex; Illinois: McHenry; Indiana: Delaware, Warren; Maryland: Anne Arundel, Prince Georges; Minnesota: Pope, Winona; New Jersey: Camden, Cumberland, Salem; Ohio: Logan; Pennsylvania: Center, Lancaster, Montgomery, Somerset; Wisconsin: Dane; Canada, Alberta: Edmonton; Saskatchewan: Prince Albert.

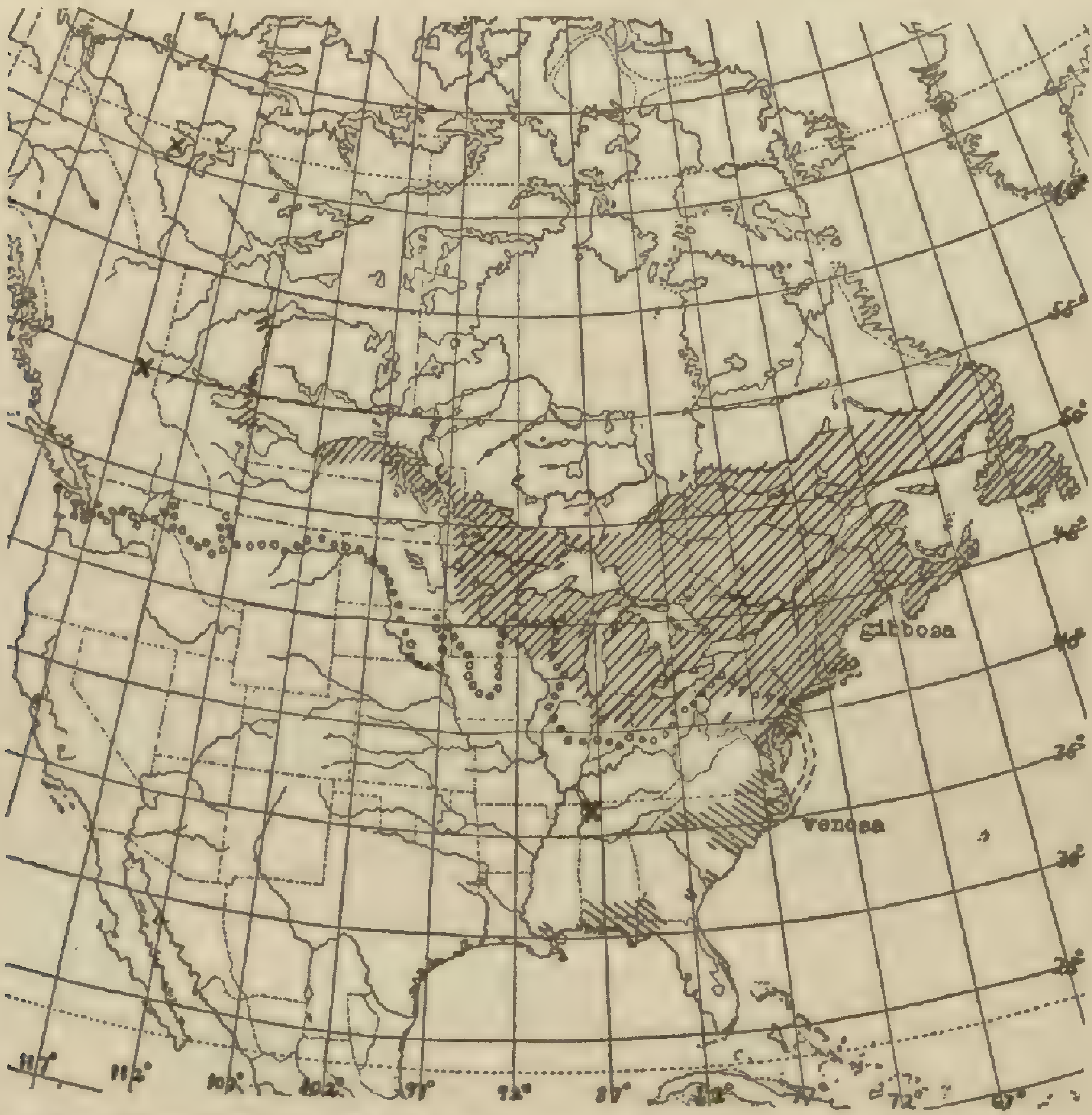

FIG. 1. Distribution of the subspecies of *Sarracenia purpurea*. The oppositely inclined rulings mark the respective areas occupied. The row of circles indicates the approximate southern margin of the Wisconsin ice sheet. The X's represent unconfirmed reports.

Sarracenia purpurea venosa (complete list).

Alabama: Baldwin, Clarke, Coffee, Escambia, Geneva, Henry, Mobile, Washington; Florida: Calhoun, Gadsden, Holmes, Leon, Liberty, Okaloosa, Walton; Georgia: Lee, Randolph, Tattnall; Louisiana: St. Helena; New Jersey: Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Monmouth, Ocean; North Carolina: Bertie, Buncombe, Carteret, Catawba, Columbus, Craven, Cumberland, Duplin, Forsyth, Henderson, Hoke, Jackson, Macon, Martin, Moore, New Hanover, Richmond, Robeson, Scotland, Wake; South Carolina: Beaufort, Chesterfield, Darlington, Horry, Kershaw; Virginia: Brunswick, Henrico, James City.

The Appalachian Relative of Sarracenia flava[1]

EDGAR T. WHERRY

In an article on undescribed and little known plants of Alabama, which appeared in 1897, Mohr[2] mentioned a pitcher-plant growing along Little River, in De Kalb County. He decided it to be identical with *Sarracenia catesbaei* Elliott, but as it was obviously related to *S. flava,* he reduced its status and named it *S. flava catesbaei.* Three years later Kearney[3] applied to this mountain plant the name *S. flava* var. *oreophila,* but failed to validate it by furnishing any descriptive data. When he came to prepare his volume on the flora of the state, Mohr[4] noted this plant to be "readily distinguished from the very closely allied *Sarracenia flava* by the strictly erect leaves with ventral wing narrower and the sides of the broad dark purple veined lamina scarcely if at all reflexed," and used Elliott's name for it. The same usage was followed by Harbison[5] in reporting a new locality.

Elliott's *S. catesbaei* was subsequently found by Macfarlane[6] to represent a hybrid between *S. flava* and *S. purpurea,* showing Mohr's application of the name to be erroneous; he did not regard Mohr's plant as distinct from *S. flava.* Some years later, however, Harper[7] called attention to another point of difference, namely the presence of short recurved ensiform leaves. In 1932 living plants were collected near Center, Cherokee County, Alabama, and the following March these bloomed in Mr. Burk's greenhouse at Latham Park. Many differences from *S. flava* were shown, and as no intergradation appears to occur, and their ranges are distinct, they are here classed as independent species, the new one becoming:

---

[1] Contribution from the Botanical Laboratory and Morris Arboretum of the University of Pennsylvania.

[2] Bull. Torrey Botan. Club 24: 23. 1897.

[3] Science 12: 833. 1900.

[4] Plant Life Ala.: 531. 1901.

[5] Biltmore Botan. Stud. 1: 155. 1902.

[6] Rept. Conf. Genetics, 1907; Journ. Botany 45: 4. 1907.

[7] J. Elisha Mitchell Sci. Soc. 34: 120. 1918.

Sarracenia oreophila (Kearney) Wherry, species nova

Plate 1, figs. 2 and 3.

S. flava oreophila Kearney, nomen nudum; Harper, nomen subnudum.

S. catesbaei Mohr et al., not Elliott.

Flat ensiform leaves short and numerous; hollow leaves (pitchers) up to 75 cm. tall, moderately constricted at junction with hood, well developed at flowering time; scent of flowers faint, musty but not unpleasant; style-umbrella sparingly pubescent to glabrate; petals little longer than the sepals, the blade narrow, greenish yellow, firm in texture and remaining outspread during anthesis.

(Folia ensiformia numerosa; amphorae ad 75 cm. longae, operculi marginibus inferioribus parum constrictae; odor floris non ingratus; umbraculum styli sparse pubescens vel glabratum; petala parum sepalis excedentia, laminis angustioribus viridi-flavescentibus rigidis per anthesem expansa.)

Sarracenia flava L. differs in having longer leaves, flowers with disagreeable feline scent, pubescent style-umbrella, and larger pale yellow petals of more delicate texture.

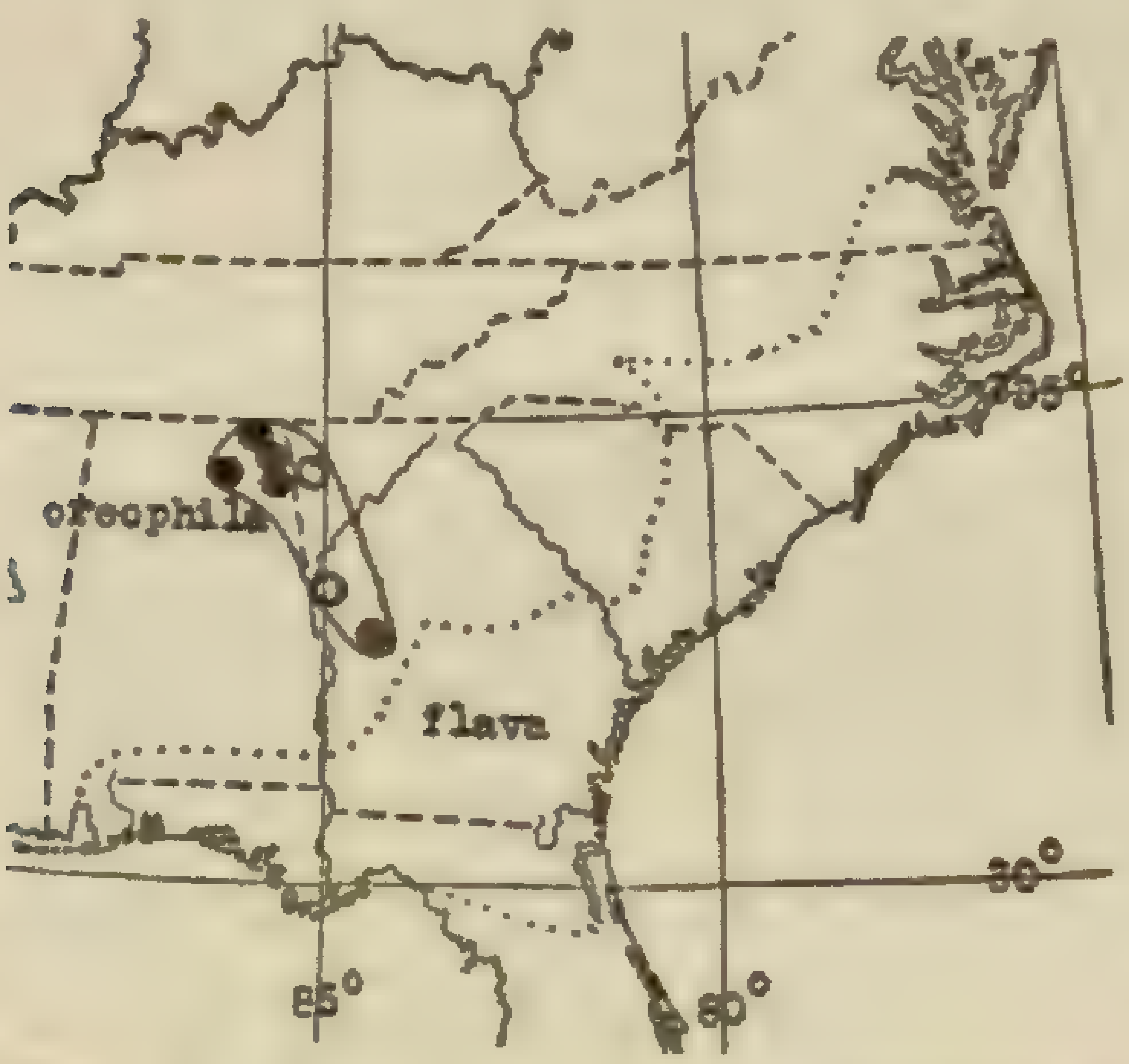

FIG. 1. Distribution of *Sarracenia oreophila*.

ALABAMA: Cherokee Co.: 2 miles northeast of Center, De Kalb Co.: "Little River, Lookout Mt., Valley Head" (Biltmore No. 371, May 22, 1899, TYPE in U. S. National Herbarium); actual locality probably De Soto Falls, southeast of Mentone; also Little River southeast of Fort Payne. Jackson Co.: Flat Rock, Higdon, Pisgah, and probably elsewhere on Raccoon or Sand Mountain. Marshall Co.: Albertville and Carpenter, Sand Mountain.

GEORGIA: Reports from Cloudland, Chattooga Co., and La Grange, Troup Co., not authenticated. Taylor Co.: Butler (Neisler, identified as *S. catesbaei* and annotated "flowers not odorous," in herbarium N. Y. Botanical Garden).

Notes on the Occurrence of Some Unusual Plants in the Virginia Blue Ridge

RUSKIN S. FREER

For some time past the writer has been making a study of fossil pollens and the contemporary atmospheric pollens and vegetation of a sphagnum bog located at an elevation of about 3,100 feet on Kennedy Mountain in the Blue Ridge, in Augusta County, Virginia. While working on this problem the writer found that there were a number of other ponds located in an alluvial fan spreading around the foot of Kennedy Mountain and two or three parallel ridges, and he deemed it advisable to investigate a number of these ponds also, to determine whether peat was accumulating in them. This was done in May, 1932.

These ponds are located in a dense and extensive stand of young and second-growth timber. They are in the geographical province known as the Valley of Virginia. Opinions of geologists as to their origin differ. One theory is that they occur in undrained areas caught behind sectors of the alluvial fan in the course of its development; another holds that they are limestone "sinks." A few of the ponds are permanent, but several of them dry up during the summer months. In a few there were small amounts of peat, with scattered growth of *Sphagnum*.

Of most interest so far as vegetation is concerned is Spring Pond. Somewhere within its confines there is a large spring, and a fairly strong stream of water flows away from the pond. Most of the others have neither inlet nor outlet. In the eastern end of the pond there are quantities of *Orontium aquaticum* and *Woodwardia virginica*. In a narrow, boggy zone, skirting the entire pond, hundreds of plants of *Drosera rotundifolia* are growing. At the western end of the pond were several plants of *Helonias bullata*. From the meagre data available to the writer on the status of these plants in Virginia, three of them appear to be of rare occurrence, at least in this part of the state.

WOODWARDIA VIRGINICA. The Virginia Chain Fern is known to be abundant in the Dismal Swamp region, and was collected near Dinwiddie on the 1932 Foray of Virginia botanists. Shreve[1] records it only from the coastal zone for Maryland. Specimens in the National Museum, although numerous, are only from the Dismal Swamp and elsewhere in southeast Virginia. The only Virginia specimens in the herbarium of the New York Botanical Garden are likewise from this section. Dr. John M. Fogg, Jr.,[2] reports a sheet in the herbarium of the University of Pennsylvania from Lynnhaven Inlet, Princess Anne County, and one from Ewell, county not given. This fern is abundant in Spring Pond, Augusta County, and also in several other near-by ponds.

ABIES BALSAMEA. On November 26, 1932, on a trip along the new Skyline Drive of the proposed Shenandoah National Park, a stop was made at Crescent Rock, a few miles south of Skyland, a summer resort. This station is in Page County. This region is the temporary stopping-point, so to speak, for several northern plants. *Lycopodium selago* and *Phegopteris dryopteris* were collected here on Hawksbill Mountain by the writer and Professor Robert P. Carroll, of the Virginia Military Institute, on July 22, 1933. On the first-mentioned visit a specimen of *Abies* was collected which was identified as *A. balsamea.* The manuals state of course that this northern species extends into Virginia. The only species of *Abies* from this station in the National Museum had been distributed as *A. Fraseri,* and as my identification of the *A. balsamea* material had been checked by several others, it appeared that the material in the National Museum had been incorrectly identified. After correspondence with the writer, Dr. Fogg enlisted the aid of Mr. E. H. Walker, of the National Museum, who found that the material contributed by E. S. Steele and wife from Crescent Rock in 1901 had been incorrectly distributed as *A. Fraseri,* the southern species, and was instead the northern species, *A. balsamea.* These are the only Virginia specimens of *A. balsamea* in the National Museum.

[1] Plant Life of Maryland, p. 388. 1910.

[2] Correspondence.

TSUGA CAROLINIANA. On October 29, 1932, during a trip to Flat Top Mountain, one of the Peaks of Otter in Bedford and Botetourt counties, *Tsuga caroliniana* was collected. Numerous groups of the trees were growing on rocky ridges on the eastern slope from an altitude of 2,200 feet up to the summit at 4,000 feet, with a few scattered trees just below the summit on the western slope. From the records at hand this appeared to be a considerable extension of range, as the Virginia specimens in the National Museum were all from southwestern counties. Professor A. B. Massey, of the Virginia Polytechnic Institute, wrote, however, that he had found this species in 1930 in Montgomery County, about 12 miles from Blacksburg on the state highway leading westward to Pearisburg, a few miles from the Montgomery-Craig County line.

On July 2, 1933, Dr. James J. Murray, of Lexington, Virginia, reported to me a conifer which was new to him, growing in Petite's Gap which lies between Thunderhill Mountain and High Cock Knob in the Blue Ridge in Rockbridge County. We visited this station on July 4, found the tree to be *T. caroliniana,* and sent a specimen to the National Museum. This is a northward range-extension from Professor Massey's station of about 21 miles, but an extension along the main axis of the Appalachian Mountains of about 60 miles. Furthermore, Professor Massey's station is in the Alleghenies, while that reported by the writer is in the Blue Ridge.

The differences between *Tsuga caroliniana* and *T. canadensis* are not obtrusive at all, but may nevertheless be noted without difficulty with a little close observation. The character which first attracted attention was the larger cones, of light brown color, and with reflexed scales. These are markedly different from the smaller, grayer cones of *T. canadensis,* which remain closed. The leaves of *T. caroliniana* are a few mm. longer than those of *T. canadensis,* and the arrangement is not complanate as in *T. canadensis.* Both species were found to be bearing male cones on April 29, 1933, when photographs were made. Those of *T. caroliniana* are reddish-purple in color, while those of *T. canadensis* are sulphur-yellow, a distinction which is not made in the manuals.

An interesting comment was made by Dr. John K. Small in confirming the identification of this tree. He writes, "Your case of *T. caroliniana* is a curious one! How did all the collectors who have been at the Peaks of Otter for the past century or longer miss it?" This comment was of even greater interest when we found some weeks later that a fine specimen of *T. caroliniana* was growing along the roadside leading up to the Peaks. Evidently most of these collectors, including myself, had passed right under it without recognizing it.

HELONIAS BULLATA. The manuals give the range of the Swamp Pink as extending from southern New York and northern New Jersey to North Carolina, but state that the plant is rare or of only local occurrence. There are no Virginia specimens at either the National Museum or the New York Botanical Garden. Dr. Edgar T. Wherry, of the University of Pennsylvania, who is familiar with the flora of Virginia, writes that he has not found the plant in this state, and it is not mentioned by Shreve (*loc. cit.*) or Merriman.[1] Dr. Fogg writes that there is no Virginia material for this species at either the University of Pennsylvania or the Philadelphia Academy, and that in the Philadelphia region, although it is locally abundant in swamps of the coastal plain, it is very rare west of the fall line. Eight or ten plants were found growing at the western end of Spring Pond near Stuart's Draft in Augusta County by the writer. My guide said this plant grows abundantly in a near-by station, but there has been no opportunity to verify this. The plant is known locally as Star Root, and is reputedly good for kidney trouble.

PARONYCHIA ARGYROCOMA. A trip was taken to explore the rocky cliffs of Rocky Row Mountain near Snowden on the James River in Amherst County on December 5, 1932. Here a new plant was found which was sent to Dr. Wherry for identification. He reported it to be *Paronychia argyrocoma*. Growing with it near the cliff edge were great quantities of *Phlox subulata australis* and some *Chionanthus virginica*, *Asplenium montanum* and a few plants of *Dicentra eximia*. Dr. Wherry commented that although the range of *P. argy-*

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[1] Flora of Richmond and Vicinity. 1930.

rocoma was from New Hampshire to Georgia, "it is rarely collected and we do not know how many stepping-stones it has between." It is not mentioned by Shreve (*loc. cit.*). Dr. William R. Maxon, of the National Museum, writes that there is a single Virginia specimen there, from the Peaks of Otter. Likewise there is only one specimen at the New York Botanical Garden, collected at Balcony Falls, Rockbridge County, in 1885, by E. G. and N. L. Britton. There are no Virginia specimens at the University of Pennsylvania, but Dr. Fogg adds that they do have material from Pendleton County, West Virginia, and from numerous localities in the North Carolina mountains.[1]

POTENTILLA TRIDENTATA. On the trip to Crescent Rock in the Blue Ridge in Page County, previously referred to, Three-leaved Cinquefoil was collected. This is one of the group of northern plants found at this station for which there appears to be a hiatus from this point to White Top and Mt. Rogers, two high peaks in southwest Virginia. Dr. Gray gives the range for this plant as extending from "Labrador to eastern New England, where it is common in exposed rocky or gravelly situations, New Jersey, and southward on upper Alleghenies." There are numerous Virginia records. Small and Vail collected it for the National Museum in 1892 from the summit of White Top Mountain, Grayson County, at an altitude of 5,600 feet, and from Iron Mountain at an altitude of 3,000 feet. There is a sheet in the herbarium at Virginia Polytechnic Institute collected by Palmer on Hawksbill Mountain, Page County, in 1901. The writer found it to be abundant at the latter station and made collections on July 22, 1933. The altitude here is 4,000 feet. Dr. Maxon states in a letter to the writer that all National Museum specimens are from Page County. The three Virginia specimens at the New York Botanical Garden and one at the University of Pennsylvania are from White Top Mountain.

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[1] During the summer of 1933 *P. argyrocoma* was found at two other stations, Mt. Pleasant (alt. 4098 ft.) and Rocky Mountain (alt. 4010 ft.), both in Amherst County, Virginia.

The Eastern Veiny-leaved Phloxes[1]

Edgar T. Wherry

For the fourth section of the eastern Phloxes the name proposed by Peter[2] is acceptable. Its distinctive features comprise wholly deciduous foliage, relatively large leaves with prominent areolate veins and minutely hispid-serrulate margins, a compound corymbose-paniculate inflorescence, whitish anthers, and styles equalling or exceeding the corolla-tube. Although numerous names have been proposed for plants which belong here, the majority of these were applied to variants without taxonomic significance or to horticultural forms of unknown origin, and only two species are clearly distinguishable, as indicated by the following tabulation.

PHLOX, SECTION PANICULATAE: KEY TO SPECIES

Mature plant 50 to 150 cm. tall, with few nodes; leaves opposite, relatively broad, their surfaces often beset with coarse bristles; inflorescence densely glandular-pubescent; corolla-tube glabrous; anthers usually all included .... 14. *P. amplifolia*

Mature plant 75 to 200 cm. tall, with numerous nodes; leaves tending to be subopposite, narrow to moderately broad, their surfaces glabrous to pubescent but rarely coarse-bristly; inflorescence more or less pubescent but infrequently glandular; corolla-tube often pubescent; one or more anthers exserted .... 15. *P. paniculata*

While the large and often coarse-bristly leaves of *P. amplifolia* seem more specialized than those of *P. paniculata,* most of the features of the former indicate it to be the more primitive. The ancestor of both is presumably to be sought in a member of the section *Ovatae,* and *P. carolina heterophylla,* discussed in a preceding article in this series, does indeed bear some resemblance to them. The differences are too marked, however, to regard the relationship as close, and the real connecting links between the two sections have apparently become extinct.

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[1] Contribution from the Botanical Laboratory of the University of Pennsylvania. Previous articles in the series have appeared in BARTONIA 11: 5. 1929; 12: 24. 1931; 13: 18. 1932; and 14: 14. 1932.

[2] In Engler & Prantl's Pflanzenfamilien 4³ᵃ: 47. 1891.

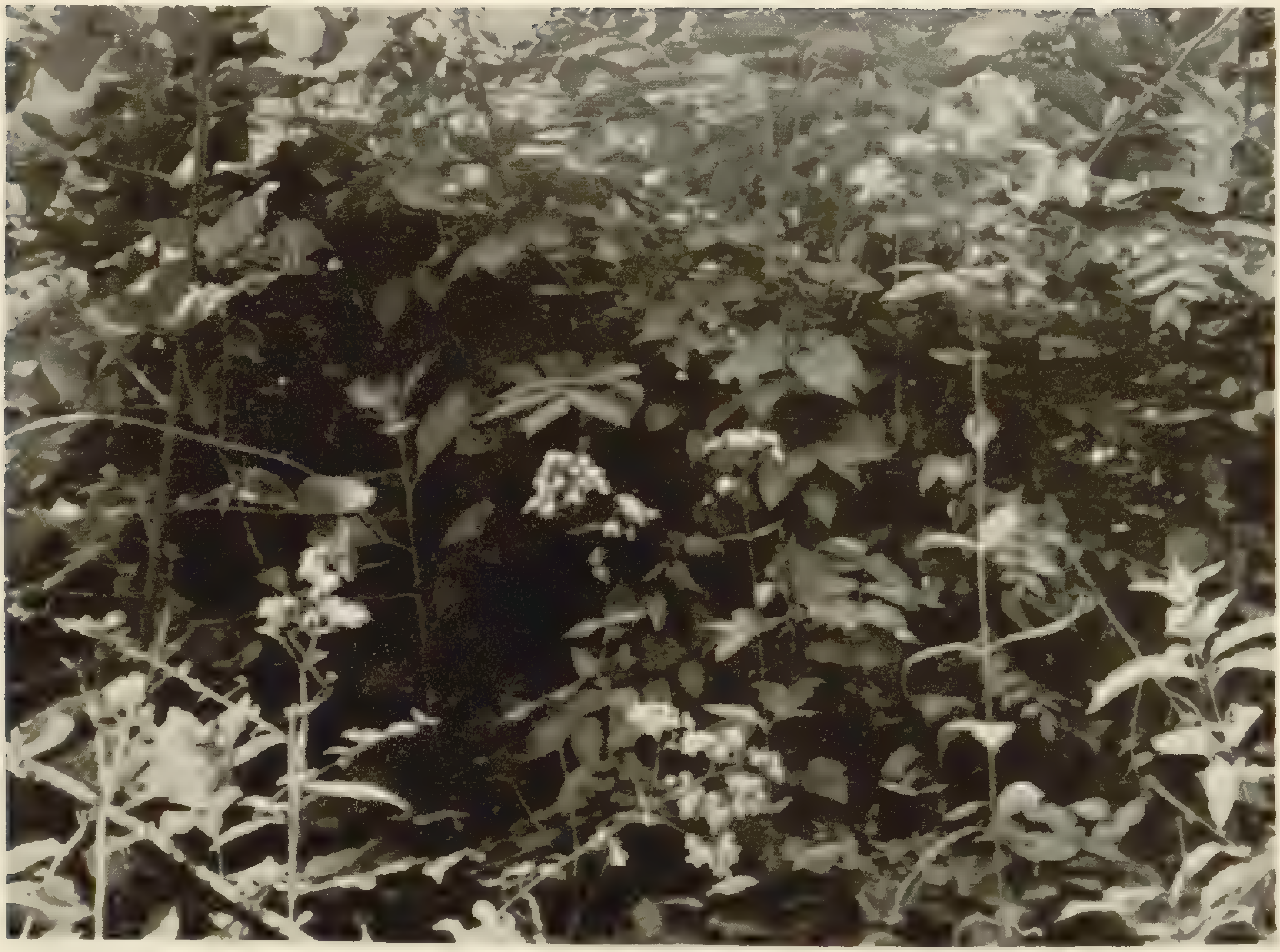

FIG. 1. *Phlox amplifolia.*
One mile northeast of Willets, Jackson County, North Carolina.

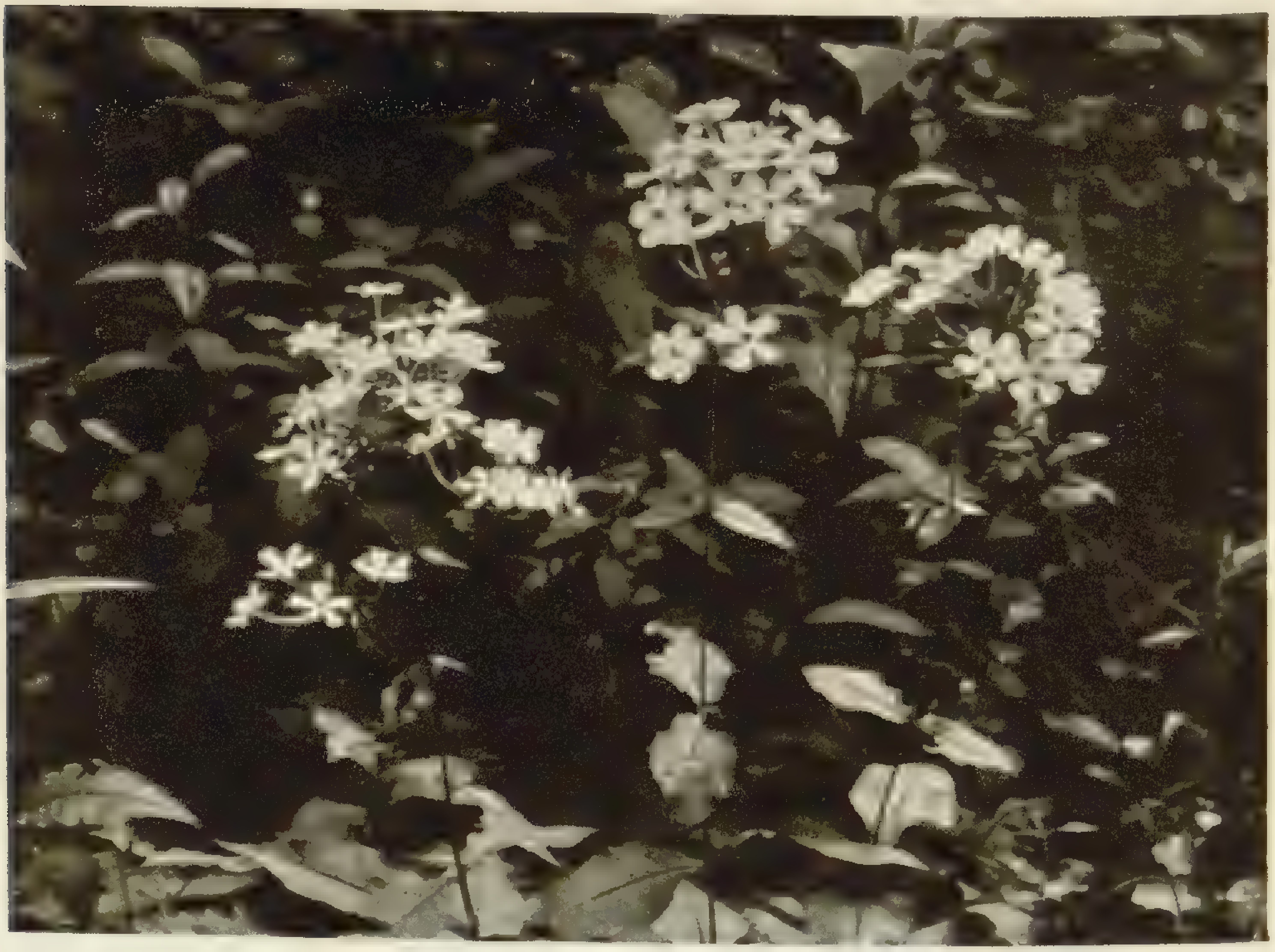

FIG. 2. *Phlox amplifolia.*
In cultivation; originally from Indiana.

14. **Phlox amplifolia** Britton. BROAD-LEAF PHLOX. Plate 2.

History.—Among the names regarded as synonyms of *P. paniculata* Linné by Gray[1] in his revision of the *Polemoniaceae* was included "*P. glandulosa,* Shuttleworth, coll. Rugel, pubescent form." So little description was thus given that the name lacks validity, but it may have represented a member of the *Paniculatae* which differs from the typical species of this section in several important respects. Mohr[2] collected the same *Phlox* in Alabama, considering it a "well-marked variety," and identifying it with *P. paniculata* var. *acuminata* (Pursh) Chapman. His specimens, preserved in the U. S. National Herbarium, do not, however, agree with Pursh's original description. Britton,[3] on the other hand, recognized it to be an independent species, and gave it the appropriate name *P. amplifolia.*

Not considering the publication of a description necessary to validate a name, Brand[4] adopted that ascribed by Gray to Shuttleworth, and gave the date of its original use as 1842, presumably on the basis of an annotated sheet bearing a Rugel specimen. Finally, Robinson and Fernald[5] returned to Gray's view that the *Phlox* under discussion is identical with *P. paniculata.* Here the two are regarded as sufficiently different to deserve independent status, and Britton's name as the only acceptable one.

Geography.—Although herbaria do not contain many specimens of this *Phlox,* enough have been seen to show its range to center about the Interior Low Plateau province in Tennessee, and to extend from east-central Alabama to eastern Missouri, southern Indiana, and western North Carolina. The Fall Line has formed a barrier to its migration southward, and it has been unable, during the period since the retreat of the last ice sheet, to invade the glaciated territory. These relations are brought out in the map (fig. 1) which appears on the following page.

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[1] Proc. Amer. Acad. Arts Sci. 8: 249. 1870.

[2] Plant Life of Ala. 684. 1901.

[3] Manual Flora N. States & Can. 757. 1901.

[4] In Engler's Pflanzenreich IV. 250: 61. 1907.

[5] In Gray's Manual, ed. 7. 674. 1908.

ALABAMA: The report of this *Phlox* by Mohr has already been referred to under History; the county list is: Clay, Coosa, Lee, Madison, and St. Clair.

GEORGIA: Known only in Floyd and Walker counties.

[ILLINOIS: Specimens from Wabash County labelled *P. amplifolia* in several herbaria represent a pubescent form of *P. paniculata* instead.]

INDIANA: Fairly common in 4 southern counties: Crawford′, Harrison′, Jefferson, and Perry.

KENTUCKY: Short collected this species on the "Barrens," perhaps in Barren or Logan County, and specimens have also been seen from Franklin, Green, Jefferson, and Woodford.

MISSOURI: Rare in the eastern part, being known only from Reynolds and St. Louis counties.

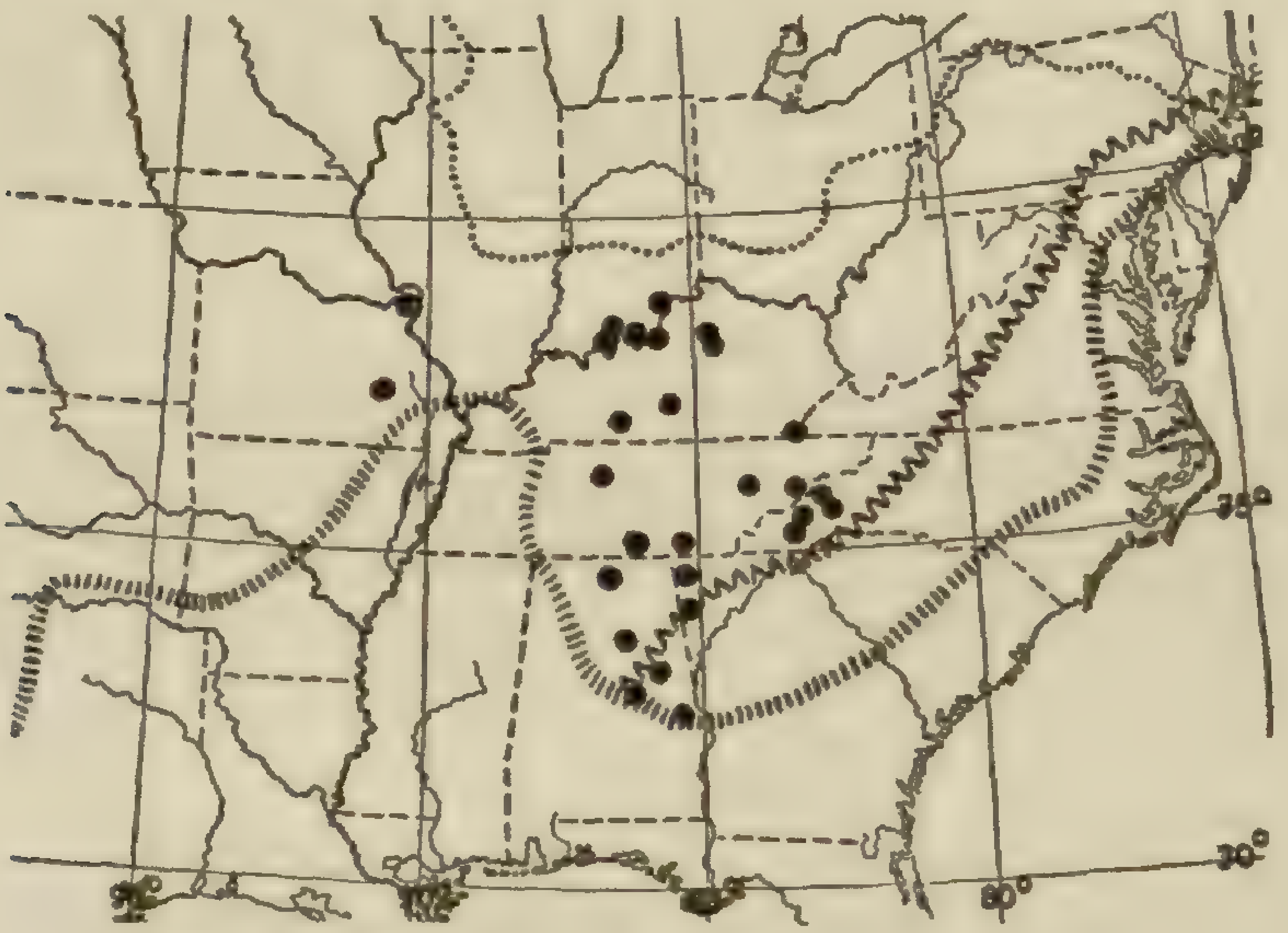

FIG. 1. Distribution of *Phlox amplifolia*.

NORTH CAROLINA: Occasional in the mountain counties: Buncombe, Haywood, Jackson′, and Madison.

TENNESSEE: Five counties are represented in herbaria: Cocke, Davidson, Franklin, Hamilton′, and Knox′.

VIRGINIA: Known only in Lee, the southwesternmost county.

[WEST VIRGINIA: In the University of Pennsylvania herbarium there is a sheet labelled Hawks Nest, (Fayette County,) bearing a specimen of *P. amplifolia* along with one of *P. paniculata*. In view of the uncertainty as to whether both belong with the label, the record requires confirmation.]

Ecology.—Unlike its more wide-spread relative, *Phlox amplifolia* is not in general an alluvial soil plant, but grows chiefly on rocky hillsides clothed with climax forests, where the soils are rich in humus and circumneutral in reaction. It begins to bloom in early June and continues throughout the Summer. The sweet-scented flowers are rather pale in color, and no doubt attract moths as well as butterflies. That the species lacks aggressiveness is clearly brought out by the scattering of the dots on its distribution map, as well as by its failure to enter the glaciated area during the many thousands of years since the ice retreated. It is probably a relic-endemic, which is in process of dying out.

Variation.—In height this *Phlox* ranges from about 50 to 150 cm., and the stem varies from uniformly green to strongly red-maculate. Its leaves are larger than those of any other member of the genus, their average maximum size being 115 by 45 mm., with a range of 60 to 180 by 20 to 80 mm. They often have a broad petiole expanding rather abruptly into a rhombic-ovate blade, but the latter may be elliptic-lanceolate, ovate-oblong, etc., and rarely the petiole is absent. The upper surface of the leaves is normally beset with coarse bristles arising from papillae, varying considerably, however, in size and abundance; the lower surface usually bears numerous fine hairs, sometimes mingled with coarse ones. Locally, especially in Indiana, there occurs a well-marked form, in which the leaves are glabrous on both surfaces.

The calyx does not vary significantly, but the corolla shows considerable range in size and in color, being usually pale to deep pink, and rarely tending toward phlox purple. While the anthers are sometimes nearly as intensely yellow as in the species of other sections, they are more often pale yellow to cream-colored, as in the second member of the present section. The style is moderately long, from 12 to 22 mm.

Cultivation.—Being less vigorous and paler in corolla-color than the related *P. paniculata*, the present species has apparently never been brought into cultivation. It is worthy of trial, however, in wild-flower gardens.

15. **Phlox paniculata** Linné. VEINY-LEAF PHLOX. Plate 3.

History.—This species was first recorded by Plukenet[1] in 1700, with the characterization "Lychnidea *Virginiana* Blattariae accedens, umbellata, maxima, Lysimachiae luteae foliis amplioribus"; the source of his material is unknown. John Bartram sent it to Peter Collinson, and in a letter dated June 11, 1743, later published by Darlington,[2] referred to it thus: "The other, which I brought from Virginia, grows with me about five feet high, bearing large spikes of different coloured flowers, for three or four months in the year, exceeding beautiful." In the catalog of Collinson's garden edited by Dillwyn[3] it is entered as "Lychnidea folio Persica, floribus in spicam depositis. 1744, a new lychnidea, sent by J. Bartram, with a large spike of pale reddish purple flowers with peach-shaped leaves, flowered in July and August." Linné[4] listed it as the first species of the genus, and noted that he had obtained it from Collinson.

A figure published by Dillenius[5] under the name "Lychnidea folio salicino" is often regarded as representing *Phlox paniculata,* but bears a closer resemblance to *P. carolina.* A colored plate showing clearly the characteristic features of the former species appeared, however, in the second volume of the Figures of Plants in the Gardeners' Dictionary issued by Miller[6] in 1760, and it has been repeatedly figured during subsequent years.

Far more names have been applied to variants of this species than to those of any other *Phlox,* but only the more important of these from the technical standpoint will be discussed here. The earliest, *P. undulata,* was apparently first published by Aiton,[7] though also used by various other writers of the same period. The supposed distinctive feature of undulate leaves is often shown by otherwise typical *P. paniculata,* a species which varies markedly in foliar characters.

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[1] Mantissa 121. 1700.
[2] Memorials of Bartram and Marshall 164. 1849.
[3] Hortus Collinsonianus 39. 1843.
[4] Species Plantarum (1): 151. 1753.
[5] Hortus Elthamensis 1: 205, pl. 166, fig. 203. 1732.
[6] Figs. Plants Miller's Gard. Dict. 2: pl. 205, fig. 2. 1760.
[7] Hortus Kewensis 1: 205. 1789.

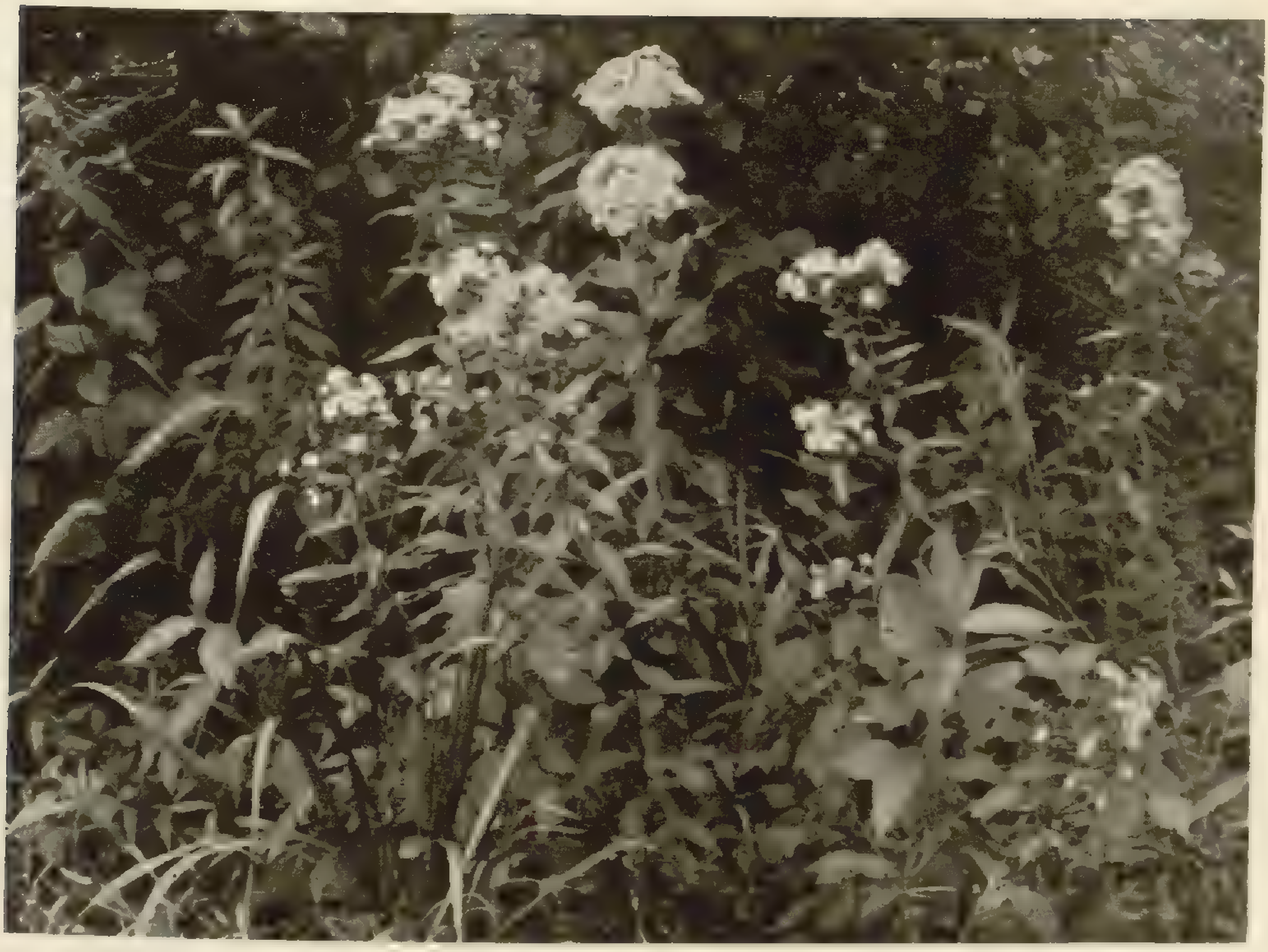

FIG. 1. *Phlox paniculata.*
One mile southwest of Marticville, Lancaster County, Pennsylvania.

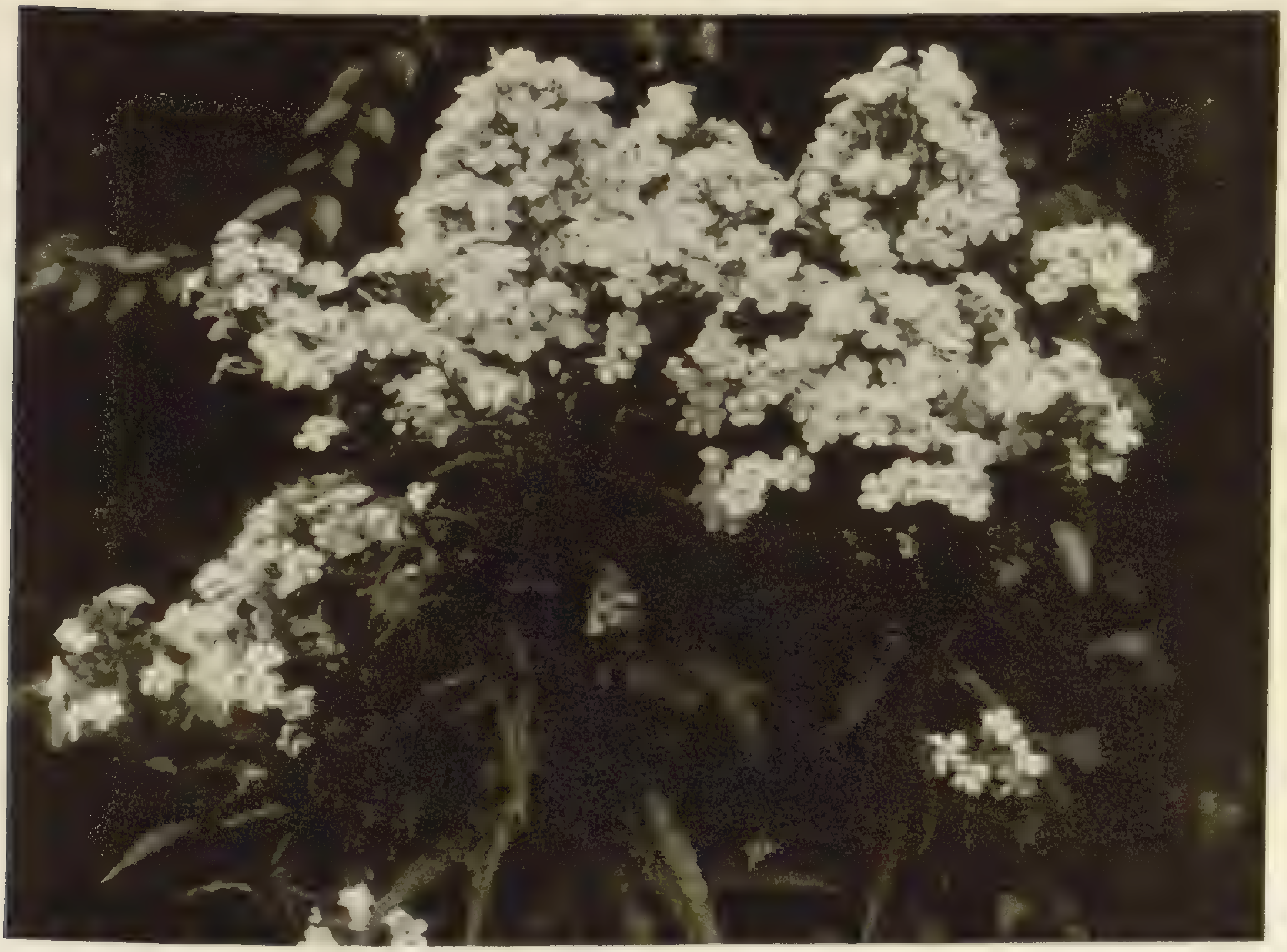

FIG. 2. *Phlox paniculata.*
In cultivation; originally from Virginia.

In a catalog of horticultural plants issued about 1812, Lyon included, according to Pursh,[1] a "Phlox decussata," but in describing this in his Flora the latter author renamed it *P. acuminata.* A close relationship to *P. paniculata* was shown in many of the features enumerated, especially in the pubescent corolla-tube, but it was considered to differ in having the leaves acuminate at both ends and pubescent beneath. The colored plate of it published by Sims[2] in 1817 left no doubt as to the identity of the two.

When he came to list the plants of South Carolina and Georgia, Elliott[3] not only maintained Lamarck's and Pursh's species as distinct, but also (on page 244) proposed another name, *P. cordata,* for material with the leaves "uniformly cordate." No type specimen of this is preserved in his herbarium at the Charleston Museum, but there can be little question of its being a mere form of the species here under discussion.

A list of seeds distributed by the Hamburg Botanical Garden in 1826 included a *Phlox sickmanni,* and two years later this was described and figured by Lehmann.[4] The name was used for a time by horticulturalists, but has long since become obsolete, as the plant was in every respect identical with *P. paniculata.*

Between 1828 and 1831 Sweet[5] published colored plates of three supposedly distinct species, *P. scabra, P. cordata,* and *P. corymbosa.* None of these, however, differs from *P. paniculata* in any respect which would now be considered of specific significance.

Bentham,[6] the first monographer of the *Polemoniaceae,* classed *P. undulata, P. cordata,* and *P. sickmanni* (misspelled "siebmanni") as synonymous with *P. paniculata,* but maintained *P. acuminata,* inclusive of *P. corymbosa,* as a distinct species.

[1] Flora Americae Septentrionalis 2: 730. 1814.

[2] Curtis's Botanical Magazine 44: pl. 1880. 1817.

[3] Sketch Botany S. C. & Ga. (1): 242. [1817]

[4] Act. Acad. nat. cur. 14: 814, pl. 46. 1828.

[5] British Flower Garden 3: pl. 248. 1828; [2] 1: pl. 13. 1829; [2] 2: pl. 114. 1831.

[6] In De Candolle's Prodromus 9: 303. 1845.

Chapman[1] reduced *P. acuminata* to a variety of *P. paniculata,* adding to Pursh's distinguishing characters "calyx-lobes shorter." Gray,[2] on the other hand, was unable to recognize any distinction, and made *acuminata* merely another synonym. Mohr[3] followed Chapman's nomenclature, but misapplied the name, as already mentioned under *P. amplifolia.*

In his southeastern flora, Small[4] considered *P. acuminata* as worthy of being restored to the list of species, but his key-characters were quite different from those given by previous authors: "Leaves conspicuously decurrent on the internodes: calyx-lobes about as long as the tube: corolla-tube pubescent." Actually, there is nothing in Pursh's description to suggest decurrence of the leaves, and moreover the leaves of otherwise typical *P. paniculata* are often more or less decurrent. The extent of union of sepals varies so greatly within single colonies as to be of no diagnostic value, even were the data of Chapman and Small in agreement. Finally, a pubescent corolla-tube is one of the most typical features of normal *P. paniculata,* so there seems no basis for specific separation between the two.

Brand[5] followed Gray in classing most of the names enumerated, including *acuminata,* as mere synonyms of *paniculata;* at the same time, he considered *P. decussata* to represent a hybrid of *P. paniculata* with *P. maculata,* but failed to furnish any supporting evidence. He also ventured to propose a variety *laxiflora* for a specimen from Missouri with narrow leaves and lax inflorescence, although this appears to represent merely a shade-form such as can be found in many occurrences of the species.

White or near-white forms appear occasionally in colonies of *P. paniculata,* and the term variety *alba* was proposed for these by Don[6] in 1838; numerous horticultural names have also been applied to them subsequently.

[1] Flora Southern U. S. 338. 1860.
[2] Proc. Amer. Acad. Arts Sci. 8: 249. 1870.
[3] Plant Life of Ala. 684. 1901.
[4] Flora SE. U. S. 977. 1903.
[5] In Engler's Pflanzenreich IV. 250: 59. 1907.
[6] Gen. Hist. Dichl. Plants 4: 240. 1838.

Geography.—Owing to the fact that *Phlox paniculata* escapes from cultivation more frequently than any other species, the determination of its natural range is especially difficult, and some of the occurrences indicated by circles on the accompanying map should probably have been marked by an × (for escape) instead. It seems undoubtedly native, however, from northern Georgia to Arkansas, northeastern Kansas, northern Indiana, and central New York. The map of its distribution shows it not only to be more wide-spread than its relative, previously discussed, but also to have locally crossed both the Fall Line and the Wisconsin terminal moraine.

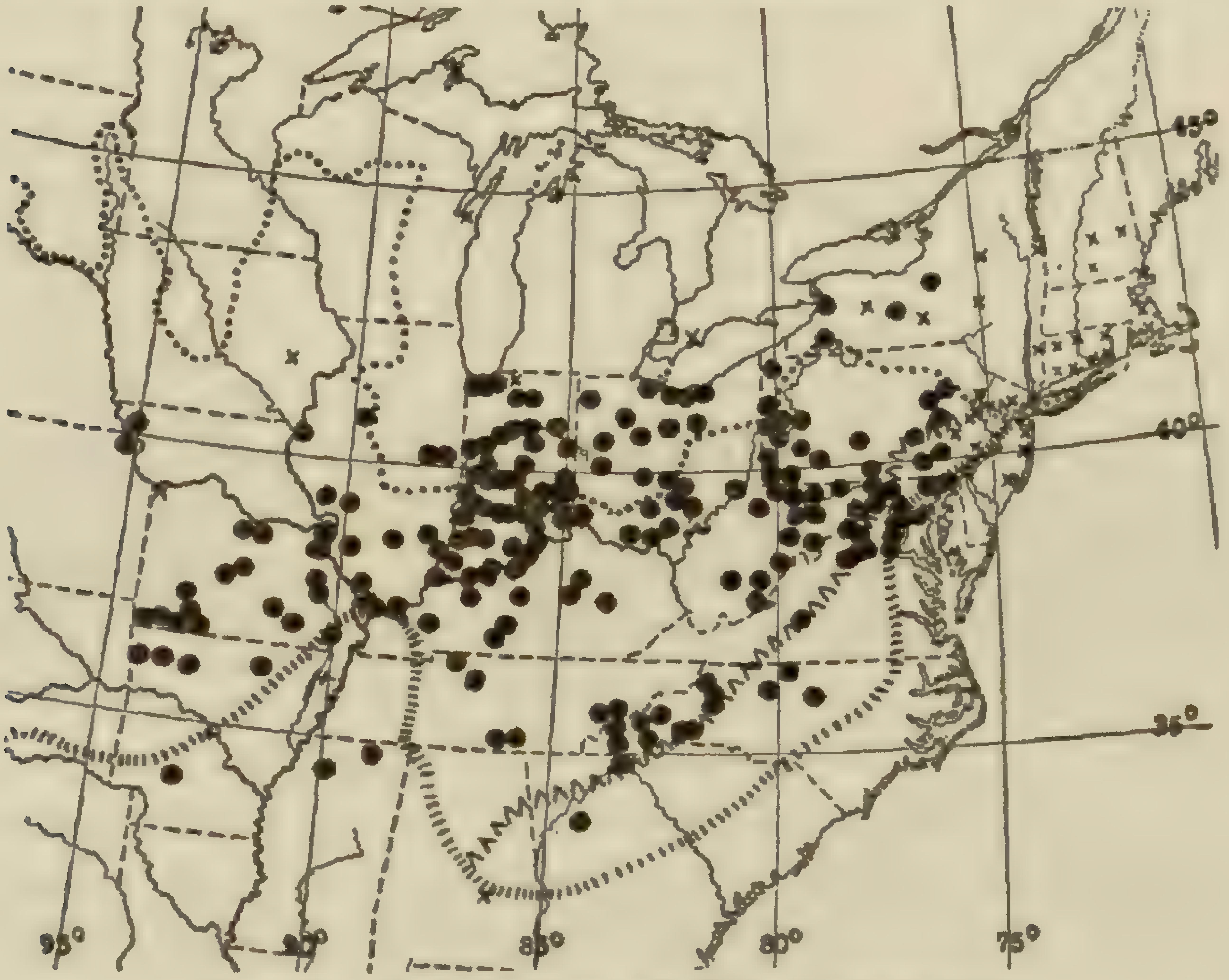

FIG. 2. Distribution of *Phlox paniculata.*

[Alabama: Recorded from Montgomery County, but scarcely native.]

Arkansas: Known in Clark, Madison, Newton, Sharp, and Washington counties.[1]

[Connecticut: A common escape throughout, the county list being: Fairfield^e, Litchfield^e, Middlesex^e, New Haven^e, New London^e, and Windham^e.]

[Delaware: Escaped in New Castle County^e.]

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[1] Prof. D. M. Moore kindly supplied this county list.

DISTRICT OF COLUMBIA[f]: Native along the Potomac and Rock Creek valleys.

[FLORIDA: Britton and Brown[1] stated the range of this species to extend to Florida, but no evidence is at hand.]

GEORGIA: Occasional in the mountains and inner Piedmont, having been seen from De Kalb and Rabun[f] counties.

ILLINOIS: Common, especially southward, the county list being: Champaign[x], Greene, Hancock, Jackson, Macoupin, Marion, Peoria, Pope, Pulaski, Richland, St. Clair, Union, Vermilion, and Wabash.

INDIANA: Present practically throughout, having been recorded from 50 counties: Bartholomew, Brown, Carroll, Cass, Clark, Clay, Crawford, Daviess, Dearborn, Decatur, Fayette, Franklin, Gibson, Grant, Hamilton, Harrison[f], Hendricks, Jay, Jefferson, Jennings, Knox, Kosciusko, Lake, Laporte, Marion, Marshall, Martin, Miami, Monroe, Montgomery, Owen, Parke, Perry, Porter, Posey, Putnam, Rush, St. Joseph, Shelby, Spencer, Sullivan, Tippecanoe, Union, Vermilion, Vigo, Warren, Warrick, Washington, Wayne, and Wells.

[IOWA: Escaped in Johnson[x] County.]

KANSAS: The westernmost known native occurrence of the species is in Doniphan County.

KENTUCKY: Collected in but 8 counties: Caldwell, Daviess, Edmondson, Fayette, Hardin[f], Lee, Mercer, and Warren.

[LOUISIANA: The statement under Florida applies here.]

MARYLAND: Common in the upland counties: Allegany[f], Baltimore, Cecil, Frederick, Garrett, Montgomery[f], Prince Georges, and Washington.

[MASSACHUSETTS: Escaped in Bristol[x], Essex[x], Middlesex[x], Norfolk[x], and Suffolk[x] counties.]

[MICHIGAN: Reported to escape locally.]

MISSISSIPPI: Present in Panola and Tippah counties; further south *P. glaberrima* has been mistaken for it.

MISSOURI: Wide-spread, material being preserved from 19 counties: Barry, Carter, Christian, Cole, Greene, Holt, Jackson, Jefferson, Laclede, McDonald, Madison, Osage, Pulaski, St. Francois, St. Louis, Shannon, Stoddard, Stone, and Taney.

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[1] Illustr. Flora N. U. S. 3: 32. 1898.

[NEW HAMPSHIRE: Recorded as escaped in Belknap^x, Cheshire^x, and Sullivan^x counties.]

[NEW JERSEY: Specimens have been preserved from 6 counties, but none are regarded as native: Atlantic^x, Monmouth^x, Morris^x, Ocean^x, Somerset^x, and Warren^x.]

NEW YORK: Occurs, in part as a garden escape, in Bronx Boro^x, Cattaraugus, Dutchess^x, Erie, Herkimer^x, Livingston^x, Onondaga, Otsego, Suffolk^x, Tompkins^x, Washington^x, and Yates counties.

NORTH CAROLINA: Frequent along stream-valleys in the mountains and higher Piedmont, the county list being: Buncombe, Burke, Caldwell^f, Forsyth, Haywood, Macon, Orange, Polk, Rockingham^f, Rutherford^f, Swain, Transylvania^f, and Watauga.

OHIO: Wide-spread, having been collected in 22 counties: Adams, Athens, Auglaize, Cuyahoga, Defiance, Erie, Fairfield, Franklin^f, Hamilton, Hancock, Hocking, Jackson, Lorain, Marion, Miami, Monroe, Ottawa, Perry, Richland, Ross, Scioto, and Wayne.

PENNSYLVANIA: Native except in the easternmost counties, where it often escapes: Allegheny, Armstrong, Beaver, Berks^x, Butler, Columbia, Crawford, Dauphin, Delaware^x, Fayette^f, Franklin, Greene, Huntingdon, Lancaster^f, Lawrence, Lehigh^x, Luzerne, Montgomery^x, Monroe^x, Northampton^x, Philadelphia^x, Schuylkill, Somerset^f, Washington, Westmoreland and York.

[SOUTH CAROLINA: Listed by Elliott;[1] no specimens seen.]

TENNESSEE: Rare, there being but 6 county records: Cheatham, Davidson, Franklin, Marion, Montgomery, and Sevier.

[VERMONT: Reported to escape occasionally.]

VIRGINIA: Common northward, in the counties: Arlington, Bedford, Culpeper^f, Fairfax^f, Frederick, Greene^f, Madison^f, Prince William^f, Rappahannock^f, Shenandoah^f, and Stafford^f.

WEST VIRGINIA: Occasional throughout, records having been seen from: Fayette, Grant^f, Greenbrier, Harrison^f, Jefferson^f, Monongalia, Monroe, Pendleton, Pochahontas, Preston, Randolph^f, and Tucker counties.

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[1] Sketch Botany S. C. & Ga. 1: 242. (1821)

[Wisconsin: Escaped in Kewaunee[x] County.]

[Canada: Ontario: Has been seen from Kent[x] Co.]

Ecology.—The typical native habitat of *Phlox paniculata* is a thinly wooded alluvial flat where the vegetation has reached an intermediate successional stage. The soil is correspondingly circumneutral in reaction and rich in plant-foods. When it escapes from cultivation, however, it may occupy all sorts of locations, including weedy roadsides and rubbish heaps. Its blooming period extends from about the first of July to the last of September, with occasional stragglers into early winter. The bright purple flowers attract numerous butterflies, which cross-pollinate it and lead to the production of abundant viable seed.

Variation.—Under cultivation this species has given rise to an extraordinarily large series of forms, which are only partially foreshadowed by variations observed in nature. Its stem ranges in height from 75 to 200 cm., with 15 to 40 nodes, at a few of which the leaves are opposite, but at most distinctly subopposite. The leaf-outline varies from narrowly elliptic-lanceolate to oblong-ovate, the blades being usually borne on a short margined petiole but sometimes sessile and more or less cordate. On their surfaces the leaves are often wholly glabrous, but on occasional individuals in many colonies they become downy-pubescent beneath, and less frequently bristly above.

Considerable variation is shown in the size and compactness of the inflorescence, but this seems to be of ecological origin, and connected with the extent of crowding or shading. The inflorescence-herbage is usually somewhat pubescent, at least up to the base of the calyx, the hairs being in most cases sharp-pointed, though exceptionally gland-tipped. The sepals range from 6 to 10 mm. long, and are united from $\frac{1}{3}$ to $\frac{2}{3}$ their length.

Phlox-purple is the predominant corolla-color, with occasional trends toward amparo-purple (Ridgway 63 b) or mallow-purple (67 b), and toward white, but there seems no indication in the native colonies of the varied and brilliant hues which have been brought out by horticulturalists. Eye-striae are also less conspicuous in nature than they have become in cultivated forms.

The corolla-tube varies in length from 16 to 26 mm., and, while usually strongly pubescent, is glabrous in exceptional individuals. The broadly to narrowly obovate lobes have been observed in nature to range from 7 to 12 mm. in length and 5 to 11 in width, although in some of the garden forms they are over twice the maximum sizes stated. Stamens and style vary from wholly included to slightly exserted.

No geographic segregation in any of the variable features above enumerated having been recognized, the species is not here separated into varieties; the more noteworthy of its forms may, however, be listed:

FORMS OF PHLOX PANICULATA

Cordate-leaved. *P. cordata* Elliott. Occasional, grading into truncate-leaved.

Rough-pubescent on upper leaf-surfaces. *Phlox scabra* Sweet. Rare.

Soft-pubescent on lower leaf-surfaces. *Phlox acuminata* Pursh. *P. decussata* Hort. ex Pursh. *P. paniculata acuminata* Chapman. Frequent.

Lax-flowered. *P. paniculata laxiflora* Brand; the plant to which this name was applied also had unusually narrow leaves, and apparently represented an ecological form.

Glandular as to inflorescence-foliage. Typified by specimen from roadside thicket 3 miles west of Amissville, Rappahannock Co., Va., collected by E. T. W. August 23, 1927. Infrequent.

Glabrous-tubed. Typified by specimen from woods along Rock Creek one mile south of Kensington, Montgomery Co., Md., collected by E. T. W. August 13, 1927. Very rare.

Light-colored (pink, white, etc.). *P. paniculata alba* Don; also bearing numerous horticultural names. Frequent.

Cultivation.[1]—First introduced into horticulture, according to Aiton,[2] by James Sherard in 1732, this *Phlox* has received far greater development than any other species. In Standardized Plant Names Olmsted, Coville, and Kelsey[3] listed 270 named "horticultural varieties of Phlox paniculata or hybrids between that species and P. maculata" known to be in the trade in 1923, and others have been introduced subsequently. These have apparently largely been produced by cross-breeding of mutants which have chanced to appear in cultivation;

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[1] *Cf.* Pridham, Proc. Amer. Soc. Hort. Sci. 1931: 419–421.

[2] Hortus Kewensis 1: 205. 1789.

[3] Standardized Plant Names 365. 1923.

whether hybridization with other species has entered in deserves further inquiry.

The view that at least part of the horticultural forms of *P. paniculata* or "P. decussata" represent hybrids of this species with *P. maculata* has frequently been expressed. If that cross had actually occurred, however, some traces of the features characterizing *P. maculata,* such as obscure veining in the leaves, short calyx-lobes, glabrous corolla-tube, and deep yellow anthers, would be expected to appear in the hybrid plants. All the horticultural material which has been available for examination, however, has proved to exhibit the prominent leaf-veins, long calyx-lobes, pubescent corolla-tube, and cream-colored anthers typical of *P. paniculata* itself. Moreover, most of the cultivated plants produce abundant viable seed, and when this germinates the seedlings all show the features of the latter species (including a dingy corolla-color, as gardeners know to their sorrow,) whereas were a bispecific hybrid represented, a certain proportion of any seedlings would correspond to the other parent. All the evidence thus indicates that the presumed cross has not entered into the development of the horticultural material in question.

By way of contrast, the so-called "Phlox arendsii" combines the features of *P. paniculata* with those of *P. divaricata* in such a striking way as to leave no doubt that it represents the result of crossing these two species. So far as known, no viable seeds are produced, which also favors the hybrid interpretation.

The Phloxes discussed in this paper complete the list of those known to occur native in the United States east of the Mississippi River. It is proposed to publish in the next number of "Bartonia," however, a supplementary article in which data which have come to hand since the series was started will be placed on record. The writer will greatly appreciate the receipt of information as to errors or omissions which anyone may have noted, and in particular names of additional counties in which individual species have been found, for inclusion in this supplement.

Fimbristylis darlingtoniana, a Sedge peculiar to the Serpentine Barrens

FRANCIS W. PENNELL

Among the plants that in my study of the flora of the "Conowingo," or Serpentine Barrens,[1] were listed as restricted in the Philadelphia Local Area to those isolated outcrops was a small sedge that grows in moist soil of evidently high magnesian content. Its spikelets, with lustrous chestnut brown scales, reach maturity in September. Following the current manuals, I called the plant *Fimbristylis laxa* Vahl.

But recent authors consider that Vahl's species, which was described from South American plants that likely came from Guiana, does not occur in the temperate flora of the United States. The second edition of Britton and Brown's "Illustrated Flora" (1: 321. 1913) returned to the name of *Fimbristylis baldwiniana* Torr., a species that was clearly Nearctic. Following this judgment I was quite willing to accept this name for the plant of the Serpentine Barrens, until the incongruous nature of its supposed distribution caused me to look further into the problem.

The main range of "Fimbristylis baldwiniana" is through the southeastern Coastal Plain. We have in the Academy's herbarium specimens from Texas to Florida and then northward to the "eastern shore" of Maryland, but the species has not been found among all our many collections from southern New Jersey. Why should a species with so obvious a natural range extend northward upon the Serpentine of Pennsylvania rather than the lighter soils of New Jersey? Why should it be so partial to magnesian soil as to be present upon nearly every barren, but nowhere else in the Philadelphia area? At once I suspected the identity of the Serpentine and southern Coastal Plain plants, and comparison has shown them to be distinct species. The latter is usually larger, with a tendency to compound umbels of spikelets, its scales are duller and paler, while, most distinctive of all, its achenes are yellowish, with sharper, more evident, longitudinal ridges. The Serpentine plant nearly always has simple umbels of fewer spikelets, its scales are darker brown, and its achenes silvery white, with more rounded and lower ridges.

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[1] Proc. Acad. Nat. Sci. Phila. 62: 549. 1911.

But which was the original *Fimbristylis baldwiniana?* The history of that name is not so simple as might be supposed from its citation in the "New Illustrated." Torrey, in his "Monograph of North American Cyperaceae," read August 8, 1836, and apparently published by the end of that year in the "Annals of the Lyceum of Natural History of New York," first used this name and gave the species the habitat: "Damp clayey soils, Pennsylvania to the Gulf of Mexico, and west to the Mississippi." His Pennsylvania material, whence came probably the allusion to "clayey" soil, was clearly our Serpentine plant, but his other specimens were (nearly or wholly) the species of the southern Coastal Plain; his description was likewise composite. No reference was made to any collection by Baldwin, and, since that botanist commenced his botanical interest in Chester County, Pennsylvania, and continued it in coastal Georgia, it is evident that he might have gathered either species. Inspection of Torrey's synonymy, however, show that the specific name did not really originate with him, for his species, instead of being new, was actually based upon *Scirpus baldwinianus* Schult. Schultes in 1824 had in turn based his species upon *S. sulcatus* Ell. (1816), not of DuPetit Thouars (1811). At last we reach the basis of Torrey's name in Elliott's new species of twenty years earlier; Elliott had then founded it on his own collection from near Charleston, South Carolina, but stated that his first knowledge of the plant came from specimens sent him from Savannah, Georgia, by Dr. Baldwin. Fortunately the Academy possesses material of both Elliott's and Baldwin's collections, and both are the species of the southern Coastal Plain.

It therefore becomes clear that the plant of the Serpentine Barrens must be described as a new species, and for it I propose the name of *Fimbristylis darlingtoniana.* It is most fitting that this plant, restricted to these barrens and occurring most abundantly in Chester County, should perpetuate the memory of the author of the "Flora Cestrica." In the 1837 edition of that work, under the appellation of *Scirpus baldwinianus,* occurs an excellent description of our species, the only one that has been hitherto made. Although a few points may be added now, I have wished to carry forward the thought of this being Darlington's species and for that reason have selected as type Edwin B. Bartram's excellent collection from the very barren that Darlington knew most intimately. It is a rare privilege to dedicate to the memory of Dr. Darlington a species with so clear a right to bear his name.

The following summary of the two species considers only the material in the herbarium of the Academy of Natural Sciences, the localities of each state being grouped under counties. The species may be contrasted:

Achene pale yellow, finely and sharply striate-sulcate, about 1 mm. long; scales pale brown, green-ridged, dull or slightly shining, as wide as long, acute or slightly mucronulate, slightly bowed, wholly appressed; spikelets several, on the widely spreading rays of the simple or once-compound umbel; stem usually 2–3.5 dm. tall........................1. *F. baldwiniana*

Achene silvery white, striate or slightly sulcate, slightly more turgid, about 1.25 mm. long; scales dark brown, green-ridged, lustrous, strongly bowed and with tips loosely ascending; spikelets 1 to 6, on the ascending rays of the nearly always simple umbel; stem usually 0.5–2.0 dm. tall........................2. *F. darlingtoniana*

1. **Fimbristylis baldwiniana** (Schultes) Torrey.

Scirpus sulcatus Ell., Sketch Bot. S. Car. & Ga. 1: 86. 1816. "Grows in damp soils. . . . I have found it near Charleston." Probable isotype, labeled by Schweinitz: "Ell. ipse," seen in Herb. Acad. Nat. Sci. Phila. This and another on the same sheet labeled "Salem" in Schweinitz' handwriting, both fit Elliott's description as to height, umbel, achenes, etc., but the supposed Elliott plant is quite hairy on the leaves and sheathes, while the Salem plant, though with only slight pubescence, has too long involucral leaves. Both are the same species, however, and must belong with Elliott's plant that was described as glabrous and with "involucrum" no longer than the umbel. Neither of these specimens, nor the following either, show "leaves as long as the stem." A third, diminutive specimen, still on the same sheet, was credited by Schweinitz to Baldwin; it is only 1 dm. tall, with simple umbels of few spikelets, but the achene shows clearly the plant's identity with the foregoing. It is likely of the same collection as the material sent by Baldwin to Elliott. All three specimens on this sheet are surely the same species, which evidently varies as to degree of pubescence and length of involucral leaves. Not *S. sulcatus* Thou., 1811.

Scirpus baldwinianus Schult., Mant. 2: 85. 1824. New name for *S. sulcatus* Ell.
Scirpus elliottii Spreng., Syst. Veg. 4, cur. Post: 28. 18. New name for *S. sulcatus* Ell.
Fimbristylis baldwiniana (Schult.) Torr., in Ann. Lyc. New York 344. 1836.

Moist soil, in the Atlantic Coastal Plain from Maryland to Florida and Texas. Also on ballast at Philadelphia, Pennsylvania. Specimens seen:—(PENNSYLVANIA. Philadelphia: Philadelphia, *Leidy, Wister.*) MARYLAND. Wicomico: Salisbury, *I. S. Moyer.* VIRGINIA. Norfolk: Northwest, *Heller 1249.* NORTH CAROLINA. Forsyth: Salem,[2] *Schweinitz;* Stanley: Albemarle, *Small.* SOUTH CAROLINA. Charleston: presumably Charleston, *Elliott.* GEORGIA. Chatham: presumably Savannah, *Baldwin.* FLORIDA. Lake: Eustis, *Nash 1760.* TEXAS. Bowie: Texarkana, *Heller 4276;* "valley of the lower Rio Grande," *Buckley.*

2. **Fimbristylis darlingtoniana** Pennell, sp. nov.

Plant annual, the root fibrous. Stems many, 0.5–3.0 dm. tall, sharply angled, with channeled sides, glabrous. Leaves with brown sheaths that are pubescent below the apex opposite the blade, leaf-blade narrowly linear, slightly revolute, finely ciliolate and serrulate, over half the height of the plant. Umbel simple (or rarely slightly compound), the central spikelet sessile, 1 to 5 more spikelets on ascending lateral peduncles; umbel overtopped by one of the filiform lower involucral bracts, the others of which are shorter than the umbel. Spikelets ovoid-conic, apparently 4–6 mm. long, the rachis ultimately over 10 mm. long but lower scales and fruits soon falling. Scales ovate-oval, concave, medianly with greenish raised keel that forms a short mucronate tip, laterally lustrous chestnut-brown, white and membranous near the

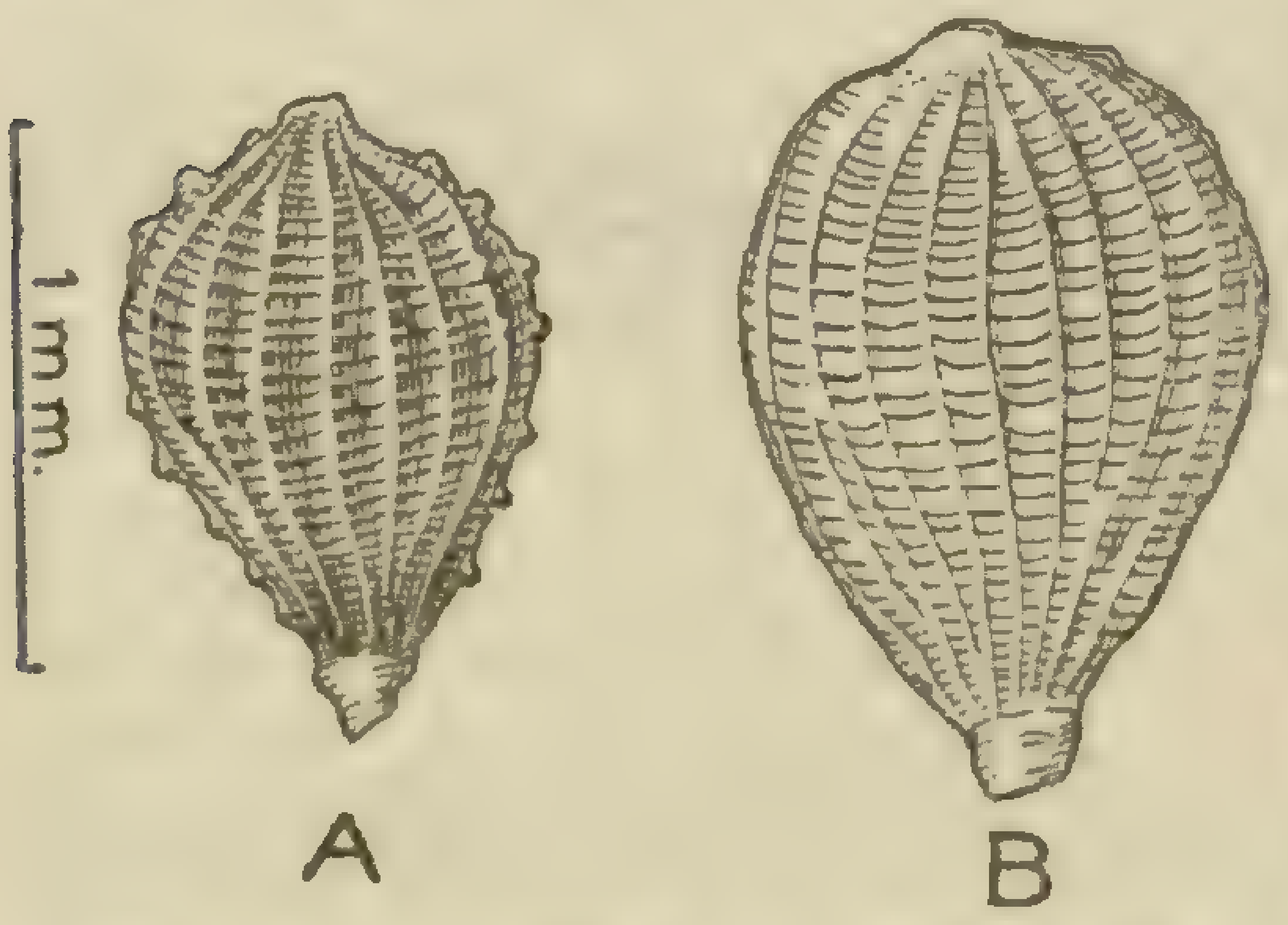

FIG. 1. Achenes of *Fimbristylis.* A—*F. baldwiniana,* G. V. Nash 1760 from Eustis, Fla.; B—*F. darlingtoniana,* E. B. Bartram from Paoli, Pa.

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[2] In Schweinitz' manuscript "Flora Salemitana" is the remark: "I have found it on Flatrocks." These "flat rocks" are granitic, and so indicate that this species occurs on sandy soil.

entire margin, wholly glabrous. Styles 2, divergent, the broad united lower portion ciliate-pubescent, the base tumid. Achene 1.2–1.3 mm. long, obovoid, slightly flattened, silvery white, striate or slightly sulcate and with somewhat less evident transverse reticulations, at least distally with low warty knobs.

(*Fimbristylis* annua; caules 0.5–3.0 dm. longi, angulati, glabri; folia anguste linearia; umbella simplex; spicula ovoidea, conica, rhachillis ultime 10 mm. longis squamisque inferioribus mox caducis; squamae ovato-ovales, concavae, castaneae, nitidae, glabrae; styla duo pubescentia; achenium obovoideum, turgidum, argenteum.)

Type, on serpentine, Fern Hill, Chester County, Pennsylvania, collected in fruit September 7, 1908, by Edwin B. Bartram; in Herb. Academy of Natural Sciences of Philadelphia.

Moist magnesian soil, open places, Serpentine Barrens of southeastern Pennsylvania, northernmost Delaware, and doubtless in adjacent Maryland. Specimens seen: PENNSYLVANIA. Chester: "Cedar Barrens" in Willistown Township, *Pennell 326;* Fern Hill,[3] *E. B. Bartram, Pennell 408;* Goshenville (Serpentine Ridge, north of), *Pennell 255, Van Pelt;* Lees Mill (on Octoraro Creek), *Pennell 10975, H. E. Stone;* Marshallton, *B. Long;* Nottingham, *Pennell 454;* Paoli, *E. B. Bartram;* Sugartown (Serpentine Ridge, north of), *Pennell 795;* Unionville, *Pennell 1001.* Delaware: "Middletown Barrens," north of Lima, *Pennell 520;* Mineral Hill, north of Elwyn, *Heritage;* Preston Run, west of Newtown Square, *Pennell 1095;* Williamson School, *Pennell.* DELAWARE. Newcastle: Centerville, *Commons.*

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[3] Lying just north of West Chester, nearest the small railroad station of Fern Hill, this barren was the one studied by Darlington for his "Florula Cestrica" (1826) and which doubtless supplied most of his Serpentine specimens.

Additions to the Flora of Bucks County, Pennsylvania

WALTER M. BENNER

Since the summer of 1932 when the Flora of Bucks County, Pennsylvania, went to press a number of new species as well as new stations for previously reported species have come to my attention as occurring in Bucks County. The species and varieties new to the County are the following:

ANDROPOGON ELLIOTTII Chapm.

Dry open soil: sterile field southeast of Eddington near Delaware River, October 9, 1932, Bayard Long, 38762.

This is a grass frequenting dry sandy or gravelly habitats. It is a southern plant which is migrating northward. In New Jersey it has become fairly well established as far north as Camden County and in Pennsylvania it has been found previously in Montgomery, Philadelphia, Delaware and Chester counties.

PASPALUM PSAMMOPHILUM Nash.

Dry open sandy soil, Pennington Island, south of Uhlertown, October 1, 1932, Walter M. Benner.

There are a number of islands in the Delaware River from Morrisville northward which are in need of botanical exploration. Wyker's Island near Kintnersville is probably better known botanically than any of the others chiefly through the efforts of the brothers John A. and Harvey F. Ruth, who lived near Monroe and found time to explore the island at intervals from 1882 to 1887. Apparently, no one ever collected on Pennington Island before Mr. Bayard Long and the writer visited it on October 1, 1932, and found this grass growing rather abundantly at the one station on the island. It is a plant occurring mostly near the coast from Massachusetts to southern New Jersey.

CYPERUS ERYTHRORHIZOS Muhl.

Border of dredged sand over tidal marshes near the mouth of the Neshaminy Creek, southeast of Eddington, October 9, 1932, Bayard Long 38777.

A plant of the eastern and middle states occurring on alluvial banks and flats but apparently only on tidal flats in the Delaware River drainage. Previous to its discovery at Eddington it was not known above Camden and Philadelphia within the local area. Its only occurrence along the Atlantic coast within our area is at Wildwood, New Jersey.

CYPERUS SPECIOSUS Vahl.

Border of dredged sand over tidal marshes near the mouth of the Neshaminy Creek, southeast of Eddington, September 24, 1932, Bayard Long 38555 and October 9, 1932, Bayard Long 38770.

This plant found growing with the preceding species is also a plant belonging in the eastern and middle states and within the local area it occurs mainly in salt marshes although its occurrence in tidal habitats along the Delaware River from Camden and Philadelphia southward was known prior to its discovery at Eddington. This was included in *C. ferax* Rich. in Gray's Manual, ed. 7.

POLYGONUM CAESPITOSUM Blume var. LONGISETUM (De Bruyn) A. M. Steward[1]

Roadside ditch, Andalusia, September 24, 1932, Walter M. Benner.

This is a plant of recent introduction and the prospects are that it will become one of our common weeds. Its native home appears to be in southeastern Asia and the near-by islands.

It is an erect or nearly prostrate annual belonging to the *P. Persicaria* group. The usually basally interrupted spikes are very slender and the achene is shiny and always triangular (1.8–2 mm. long). The ochreal bristles are firm and long (4–8 mm.), as long as or longer than the sheath itself.

The occurrence of this plant has been noted within recent years at a number of stations in the eastern United States from Massachusetts to the District of Columbia. The earliest collection within our local range was made at Rosemont, Montgomery County, Pennsylvania, July 12, 1924, by Mr. H. E. Stone. Other local stations discovered are West Chester, Chester County, Pennsylvania, September 21, 1926, by Mr. William Trimble and Riverton, Burlington County, New Jersey, August 13, 1932, by Mr. Frederick J. Hermann.

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[1] Contr. Gray. Herb. 88: 67. 1930 and Rhodora 34: 146. 1932.

LYCOPUS EUROPAEUS L.

On dredged sand over tidal marshes near the mouth of the Neshaminy Creek southeast of Eddington, September 2, 1933, Walter M. Benner.

In Dr. C. D. Fretz's "Enumeration of the plants found growing in Bucks County, Pennsylvania," published in 1905 as an appendix to W. H. Davis' "History of Bucks County, Pennsylvania," this species is reported as occurring in waste places with no localities given, the inference being that the plant occurred too frequently to quote localities. However, the writer could find no Bucks County material in any of the local herbaria. This is, therefore, the first authentic record of its occurrence within the County.

BIDENS FRONDOSA L., var. ANOMALA Porter

Border of dredged sand over tidal marsh along the Delaware River southeast of Eddington, October 9, 1932, Bayard Long 38779.

This is a variety with upwardly barbed awns and is an endemic of the tidal mud flats of the Delaware River drainage. This is its farthest north occurrence, its previously reported stations being Westville, Gloucester County, New Jersey, Gray's Ferry and Navy Yard, Philadelphia, Tinicum, Delaware County, Pennsylvania, and Wilmington, Delaware.

Euphorbia dentata in the Philadelphia Local Area

While exploring the dry, sandy pine and oak woods near Friendship, Burlington County, New Jersey, on August 12, 1932, the writer found a *Euphorbia* that could not be satisfactorily referred to any of our common species of the Middle Atlantic States. Material was collected and laid aside for future study.

Meanwhile, on October 5, 1932, accompanied by Messrs. Bayard Long and Laurence S. Moyer, I visited the grounds of the American Dyewood Company in Chester, Delaware County, Pennsylvania. The primary purpose of this trip was to enable Moyer to procure, for some electrolytic experiments on latex, living material of *Euphorbia dentata* Michx. Some time earlier Mr. T. Chalkley Palmer had found this species, native to the western and southern states, growing in profusion about the wharves and sidings here, along with many other plants foreign to the Philadelphia area that had doubtless been introduced by boat or by rail with shipmens of logwood and other supplies.

We found the plant covering almost solidly a large space at the north end of the yard, and at first glance I was struck by its resemblance to the species that I had collected at Friendship nearly two months before. Later, when the two were carefully compared, they proved to be the same.

Our only previous recorded knowledge of *Euphorbia dentata* within the Philadelphia local area has been the statement of its occurrence in Lancaster County as given in Porter's "Flora of Pennsylvania." That record was based upon specimens sent to Porter by E. Dieffenbaugh who collected the plant on the west side of Conestoga Creek close to the Pennsylvania Railroad bridge in Lancaster on August 23, 1867. Dieffenbaugh's specimens are now in the Herbarium of the Philadelphia Botanical Club.

Also in the Club's Herbarium is a sheet collected by Mr. Harold W. Pretz from a railroad siding at Treichler, Northampton County, Pennsylvania. While lacking flowers or fruit, the specimen almost certainly represents the species in question.

The range of *Euphorbia dentata* is given by Britton and Brown[1] as "Pennsylvania to South Dakota, Wyoming, Tennessee, Louisiana and Mexico." House[2] records it as adventive in Monroe County, N. Y.

The Friendship locality, although situated well within the western border of the Pine Barrens, is not above suspicion as a natural habitat. The plant was found growing rather abundantly in a disturbed sandy clearing along a wagon road leading to an old farmhouse, a combination of factors which readily permits the explanation of its occurrence there as an introduction. So far as has been determined, this is the first record of its existence in New Jersey.

Specimens of this collection (Fogg No. 4723) have been placed in the herbaria of the Philadelphia Botanical Club and the University of Pennsylvania and in the Gray Herbarium.—JOHN M. FOGG, JR., UNIVERSITY OF PENNSYLVANIA.

Leptoloma cognatum in southern New Jersey—Two Notes

Late in September, 1930, I was driving to New Lisbon, to visit again the fascinating pine barrens along the Rancocas. Just before reaching the bridge at that place, in the sandy fields around the railroad station, I noticed a peculiar grass. From a distance it suggested the purplish, plumy bunches of *Eragrostis pectinacea,* but on closer view it seemed to be *Panicum philadelphicum* with unusually long and divergent branches.

Fortunately I collected a specimen and took it to the Academy, where, with the assistance of Bayard Long, I identified it as *Leptoloma cognatum* (Schultes) Chase (*Panicum cog-*

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[1] Ill. Fl. Ed. 2. 476 (1913).

[2] N. Y. State Mus. Bull. No. 254. 473 (1924).

natum Schultes), and discovered with profound satisfaction that it had not previously been recorded from the local area of the Philadelphia Botanical Club.

The natural range of the species appears to be: Illinois to Florida, Minnesota, Kansas, and Arizona. As introduced eastward (from records in New Hampshire, Connecticut, Long Island, and this occurrence in New Jersey), it prefers open, sandy spots. It is abundant and well established at New Lisbon.—H. E. STONE.

On July 27, 1932, the writer spent the day collecting along the border of the brackish marshes just east of Absecon, Atlantic County, N. J. Here, on a dry, sandy bank, growing in the company of *Panicum oricola, P. meridionale, Cyperus filiculmis,* var. *macilentus, Carex plana* and *Plantago aristata,* was found an unfamiliar grass which was set down tentatively as a *Panicum.* Material was collected and submitted later to Mr. Bayard Long, who pronounced it *Leptoloma cognatum* (Schultes) Chase. It is thus possible to place on record a second station within the area of the Philadelphia Botanical Club for this interesting species from the western states.

From the conditions of its occurrence at Absecon one is led to believe that this grass is at home on disturbed sandy areas or recently cleared ground. Further search may show it to be more widely distributed in such situations throughout our area.

Specimens of this collection (Fogg No. 4563) have been deposited in the herbaria of the Philadelphia Botanical Club and the University of Pennsylvania and in the Gray Herbarium.—JOHN M. FOGG, JR.

Polygala verticillata and the Problem of typifying Linnean Species

FRANCIS W. PENNELL

Two years ago I discussed in this journal the species of *Polygala* that had been long confused under the name of *P. verticillata* L. That species, *P. ambigua* Nutt., and the newly recognized *P. pretzii* were each described and illustrated, and under the first named (on page 9) I showed how all three elements were included by Linnaeus (or Linné) in one species. The problem of selecting the typical component that should bear the original name was not simple, but I had hoped that my choice was logically made. However, in recent correspondence one of our most discriminating and historically interested botanists has dissented from my selection, and, as I am aware that all the evidence was not presented two years ago, I beg leave to discuss the situation anew. Perhaps the consideration of this case may shed light upon the interpretation of other Linnean species.

Polygala verticillata was described in the first edition of Linnaeus' "Species Plantarum," which work, published in 1753, introduced the new system of "binomial nomenclature" that rapidly gained favor and soon became the universally accepted method of naming plants and animals. The composing of this work was begun in 1746, and it appears probable that the class Diadelphia, which included *Polygala,* was prepared in 1750 or 1751. This becomes important as it would appear that, in the enormous task of making diagnoses for all species of plants, Linnaeus worked steadily on and rarely gave time to revision of his previous writing. (That this was Linnaeus' method of work was impressed upon me forcibly in studying the descriptions of his genera in the "Genera Plantarum"; each was prepared from a species carefully selected as typical, and the resulting descriptions stood, no matter what further or divergent species were added—see discussion in Proceedings of the Academy of Natural Sciences of

Philadelphia 82: 10. 1930.) To show the construction of a Linnean description, as well as to state what are the conditions that must be considered in selecting the typical component in this special case, I quote the account of *Polygala verticillata* from page 706 of the "Species":

> "*verticillata.* 21. POLYGALA floribus imberbibus, spicis floribus remotis, foliis linearibus verticillatis, caule herbaceo ramoso.
>
> Polygala caulibus filiformibus, foliis linearibus alternis, pedunculis spicatis. *Gron. virg.* 172.
>
> Polygala foliis imberbibus spicatis, caule erecto herbaceo filiformi ramoso, foliis linearibus. *Amoen. acad.* 2. *p.* 159.
>
> Polygala mariana quadrifolia minor, spica parva albicante. *Pluk. mant.* 153. *t.* 438. *f.* 4.
>
> Polygala quadrifolia minima marilandica, spicis florum parvis albentibus. *Raj. suppl.* 639.
>
> *Habitat in* Virginia. ⊙
>
> Folia *saepius quina ad genicula, interdum alterna.* Spicae *albae, angustissimae flosculis remotis.*"

First, to the left of the page is the trivial name ("nomen trivialum"), Linnaeus' innovation that was to become the permanent specific name. Next, introduced by the name of the genus, is Linnaeus' diagnosis, written after the manner of the polynomial names universal before 1753. Then follow as synonymns four similar polynomial names, referring to works of Gronovius, Plukenet, Ray, and, the second, to a volume of the "Amoenitates Academicae," the published theses of Linnaeus' pupils. Then comes the geographical "habitat," followed by the symbol for an annual plant. Last are two lines of remarks, by way of supplementary descriptive comment.

As the reference to the work of his students practically gives us an earlier opinion of Linnaeus himself, let us consider first the second synonymic citation. Although published in the volume of 1751, the thesis of Jonas Kiernander on "Radix Senega" was actually defended before Linnaeus at the University of Uppsala on April 8, 1749, and it was issued as a separate paper in 1749 or 1750. "Seneca Root," which was later to be known as *Polygala senega* L., was a North American plant, the root of which was counted of much value against snake-bite. Kiernander wandered far to discuss other plants in various parts of the world with similar reputation, and included among various taxonomic matters a summary of the species of *Polygala* then known. Among these (on page 139, not 159) was given the diagnosis quoted in 1753 by Linnaeus, and the same references to Gronovius, Ray, and Plukenet. The page reference was not the only detail misquoted by Linnaeus, for (as we would surely have known anyway) the second word of Kiernander's diagnosis was "floribus," not "foliis." (Such errors are further evidence of Linnaeus' rapidity of composition, and lack of subsequent revision.) Comparing Kiernander's diagnosis, actually of 1749, with Linnaeus' own, actually of 1750 or 1751, we find that the later account has added significant phrases stating that the spikes have remote flowers and that the leaves are verticillate, both of which characters are specially discussed in the remarks that conclude Linnaeus' account of *Polygala verticillata*. Translated, Kiernander's diagnosis read: "Polygala with beardless spicate flowers, the stem erect herbaceous filiform branched, the leaves linear"; the later diagnosis of Linnaeus read: "Polygala with beardless flowers, spikes with remote flowers, the leaves linear verticillate, the stem herbaceous branched," and his supplementary remarks: "Leaves usually five at the joints, sometimes alternate. Spikes white, very narrow with remote little flowers."

What were the sources of Linnaeus' knowledge? First of all, had he specimens of his own that might have given him the basis for his diagnosis, and especially for those additions to Kiernander's earlier diagnosis? There is in the Linnean Herbarium, now preserved at the Linnean Society in London, only a single collection to stand for Linnaeus' *Polygala verticillata*, and that is of the plant that I have ventured to describe as a new species *P. pretzii*. But it bears the letter "K" which was Linnaeus' mark for the plants collected by Kalm, and these were not received till June, 1751. It would have taken time to have organized Kalm's series, so that it is hardly likely that the specimen was utilized in framing the diagnosis of *P. verticillata.* It does agree in its whorled leaves however, but the flowering spikes are not as described. It must certainly have come from Pennsylvania or northward, but Linnaeus was at first so hazy about the extent of Kalm's travels that he credited certain of his species to Virginia while he supposed that many gathered in Pennsylvania or New Jersey came from Canada. (Such is the origin of the misnomer, *Linaria canadensis,* for a plant that Kalm actually found in southern New Jersey.) I suspect that Linnaeus included in the first edition of his "Species" hardly more than the new species discovered among Kalm's plants.

But are we sure that there were not other collections in Linnaeus' Herbarium, that were subsequently removed or destroyed? We are quite sure that there were, for the herbarium is said to have suffered from mice and damp in the little stone house where it remained while Linnaeus was enfeebled by age and for some years after his death. More important still is the testimory of the younger Linné that his father deliberately weeded out and destroyed duplicates from his herbarium. But we do not know that the total of these losses was great, and it is dangerous to invoke them to explain puzzling situations. Yet it may well be that part of Linnaeus' addition to Kiernander's diagnosis was due to such a lost specimen, although it is also possible that it was inserted from notes made by Linnaeus fifteen years earlier in Holland.

Linnaeus had then assisted J. F. Gronovius in the study of Clayton's plants from Virginia, helping to prepare the "Flora Virginica." Hence it was that his best knowledge of the flora of eastern North America came to be based upon plants from tidewater Virginia. For his own herbarium he obtained duplicates of most of Clayton's collections. Again and again recent botanists have come to consider Linnean species as based upon Clayton's specimens, and so have had to transfer old names from wide-spread inland species to more restricted ones of the Atlantic Coastal Plain. Is *Polygala verticillata* another such? The first citation is that to Gronovius' "Flora," and the detailed description of the flowering spike in Linnaeus' diagnosis came unquestionably from Clayton's plant. Clayton's number 563 is still preserved at the British Museum in London, and is the plant that was later called *Polygala ambigua* Nutt. That species has spikes white by reason of the expanded "wings" of the perianth, and they are very narrow with remote little flowers; it is the only one of my three that in these details fits the Linnean diagnosis. But how did Linnaeus add this information, which does not appear at all in Gronovius' account? It must have been from actual material, most probably from a Clayton specimen that was once in the Linnean Herbarium. But the slight development (only the lowest cluster) or else the complete absence of any whorling of the leaves is another character of *P. ambigua*, and, although I had seen Clayton's plant myself, I have recently been at pains to have this detail of his preserved specimens confirmed by Mr. George Taylor of the British Museum. Both Gronovius' diagnosis, and that of John Clayton quoted by him, called the leaves alternate, as the occasional whorling of the lowermost quite escaped their notice. Linnaeus included these plants in his species, utilizing either the only specimen at that time in his herbarium or possibly his notes from Holland for describing the flowering spike, but it is evident that he considered the alternate-leaved state as unusual. Certainly he did not consider it typical, as he deliberately named his species "verticillata."

My critic argues that the presence of any verticillate leaves upon the specimens presumably supplying the description of the flowering spikes is sufficient to apply Linnaeus' name "verticillata" to the Clayton component. His position is further strengthened by the fact that this is the only collection cited by Linnaeus that came from Virginia. But how do we know that Linnaeus, any more than Gronovius, noticed whorled leaves upon Clayton's collection? Certainly, if he bore his part in the preparation of Gronovius' "Flora," he let the statement as to the leaves being alternate pass into print. It is a mere presumption, and that by no means strong, that Linnaeus ever observed this whorling of the lowermost leaves. Furthermore, the character is so little developed as hardly to support the positive emphasis, in Linnaeus' diagnosis and in his selection of the specific name, upon the phyllotaxy being verticillate. We may be sure that Linnaeus selected his names with care, endeavoring to have them perpetuate what he believed to be characteristic of the species, for only such a standard accords with his customary attention to method. If so, we must acknowledge that he held the verticillate phyllotaxy to be an essential feature of *Polygala verticillata*.

If he had not yet studied Kalm's plant, and if Clayton's plant does not meet the most important essential of Linnaeus' diagnosis, what had Linnaeus seen to make him adopt so positively the name *Polygala verticillata* for his species? Of his citations there remain the two references to Plukenet and to Ray; both their polynomials speak of their plants as bearing whorled leaves. The details of their diagnoses are surprisingly alike, Plukenet's translating: "Four-leaved smaller Maryland Polygala, with small whitish spike"; and Ray's: "Four-leaved very small Maryland Polygala, with spikes of flowers small and whitish." They might have been based upon the same collection, and so I believe they were. Leonard Plukenet, in his "Almagesti Botanici Mantissa" published at London in 1700, said a little more than Kiernander and Linnaeus later quoted, informing us that his plant was collected by Dr. Krieg; he further illustrated it in his "Amaltheum Botanicum" of 1705, showing its identity unmistakably. John Ray, in the third volume (or "Supplementum") of his "Historia Plantarum" published at London in 1704, gave the diagnosis later quoted by Kiernander and Linnaeus, and added a remark that translates: "This little plant is strongly branched, at the nodes of the stem sending out four or five narrow oblong little leaves. In the highest stems and branches it offers graceful oblong spikes, composed of whitish little flowers." My reason for suspecting that this account was also based upon Krieg's collection is that in his preface Ray acknowledged indebtedness to Dr. David Krieg, a German, for plants gathered in

Maryland. The date of Krieg's collections was probably little before 1700, as both Plukenet and Ray included his plant in lists supplementary to their main text of some ten years earlier. Krieg's specimen is preserved in the British Museum, and Mr. Taylor assures me that it is wholly the first species of my paper of 1931, sustaining the identification that I had readily made from the illustration and texts. Both Plukenet's illustration and Ray's note show that the leaves may be in fives as well as fours, thus modifying one word of their diagnoses to fit Linnaeus' remark of ''folia saepius quina.''

It is this element, the first-known historically, to which I still incline to apply the name *Polygala verticillata*. It does not fit Linnaeus' description of the flowering spike or his citation of locality, but I think that those difficulties are more than balanced by the emphasis that we should place upon the source of the name chosen. The ''Species Plantarum'' has appealed to posterity as the beginning of nomenclature and descriptions, but it was not so to the master-botanist who composed it. Linnaeus felt himself a reformer, rather than originator; he was busied with assembling the many descriptions that preceded his work and organizing them under a simpler method of labeling. I think that he would have told us that his name ''verticillata'' was here selected because it was more appropriate than was ''quadrifolia,'' and that he thought of his species as being essentially the successor of that of Plukenet. That he described the flowering spike of Clayton's different species was due to the fact that he had at hand in 1750 or 1751 merely a specimen of that species or else notes taken about it; if Kalm's plant had reached him in time for his diagnosis of *Polygala verticillata,* he would likely have noted the discrepancy and Nuttall's species might have been distinguished some seventy years before 1818. But such a use of Clayton material can not affect the fact that the primary element of Linnaeus' species, so important that for it he selected his name, was the plant that he knew from literature rather than from actual specimens.

The case just presented raises an important thought, one that has hardly received full consideration in modern endeavors to interpret the composite species of Linnaeus. We are anxious to find particular specimens that may stand for his concepts, and are in danger of forgetting that Linnaeus would have described his procedure as merely identifying these specimens of his as belonging to the species of those who preceded him. Our nomenclature stands on surest grounds where Linnaeus was correct in these identifications, and where the specimens seen by him, either in his own or other herbaria, are still held to be of the same species as those that he cited. But where he was mistaken in the association of his plants with those of previous botanists, we must make a choice to decide with what species the Linnaean name should descend. It is there that we must not only work out the development of the primary diagnosis that appears in the "Species Plantarum," but also gather whatever of historical significance can be discovered from the name selected. Due weight must be given to the "name-bringing synonym."

Reviews of Three Recent Floras

It is proposed to include in each issue of our journal reviews of the more considerable books and papers that appear dealing with the plants of the mid-eastern and southeastern United States. Because not previously noted by us, the first review takes us back to a publication of nine years ago. The other works are more recent. We are ready to consider older studies of note, as well as those of more timely interest.

The Grasses of Pennsylvania[1]

The student of the flora of Pennsylvania, as well as all those interested in agrostology, will welcome Dr. Gress's Bulletin as an important contribution.

Introductory pages are devoted to instructions for collecting and studying grasses, discussion of the phylogenetic relationships of the Gramineae and descriptions of the outstanding characteristics and economic importance of the family. In a lucid and non-technical manner, calculated to interest and enlighten the beginner, the author explains the structure of the grass plant as a whole and introduces the terminology requisite to a clear understanding of the make-up of the spikelet and floret. The older terms "empty glumes" and flowering glumes" are rejected for the more concise and now almost universally accepted "glumes" and "lemmas." Diagrams are included to clarify the structure of the floret, a complete knowledge of which is so essential to correct classification, and a few of the almost limitless modifications exhibited in the composition of the spikelet are noted.

In the descriptive list of species, which occupies the main body of the work, the author has included keys to the tribes, genera and species. It is somewhat surprising to find him adhering to the now largely rejected arrangement which places the Panicoideae, with its dorsally compressed glumes and usually one-flowered spikelets, before the Poacoideae, with its laterally compressed glumes and one- to several-flowered spikelets. Most students of grasses today agree in regarding the reduced number of florets, as seen in *Paspalum, Panicum* and *Andropogon,* as an indication of more recent specialization.

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[1] The Grasses of Pennsylvania. By Ernest M. Gress. General Bulletin 384. Penna. Dept. Agr., Harrisburg. Bur. Plant Ind. Technical Series No. 2. May, 1924.

Each species is accompanied by one or more figures illustrating the more important diagnostic features of the spikelet and occasionally showing the nature of the inflorescence or the habit of the plant. Brief but adequate specific descriptions are given, as well as a statement concerning range, habitat and economic significance. Finally, to each species is appended an account of its distribution within the state.

Any adverse criticism of this bulletin must center about the feature last mentioned, namely, the paragraphs in which are listed, alphabetically by counties instead of in more logical geographical order, the localities in Pennsylvania from which each species is known. It must be confessed that this statement presents a picture of distribution which is often far from adequate and in some cases even misleading. The author admits this in part, pleading a paucity of collected material or published records to represent the occurrence in many areas. That this is true there is no intention now to deny; the situation could scarcely be otherwise in a state with an area of over 45,000 square miles including large sections of wild and unexplored territory.

Nevertheless, it appears that, in the compilation of these ranges, the fullest advantage has not been taken of the large collections in which the plants of some of the better known counties are richly represented. This is especially true in the case of the herbarium of the Philadelphia Botanical Club, with its splendid series of specimens from the ten southeastern counties. Certainly, no comprehensive study of the flora of Pennsylvania can be prosecuted without due reference to this collection. That the author is aware of its existence, is suggested by his occasional citation of "Herb. Phila. Acad. Sc." to represent the occurrence of a species in one of the ten local counties. But, that he has made the fullest possible use of this material is open to question. A few examples, taken entirely at random, may be cited as illustrative.

Looking up the distribution of *Panicum Boscii,* we find it recorded from six localities in five widely separated counties. Four of these six records are based upon the author's own collections and one is cited on the authority of Hitchcock and Chase's "North American Species of Panicum." Thus, one might infer that this species is of infrequent and local occurrence in Pennsylvania and that the chief collections representing it are those of the author. The actual situation is far different. In the herbarium of the Philadelphia Botanical Club alone there are 39 sheets from as many different localities distributed more or less evenly throughout nine of the southeastern counties and all collected before 1924, the date of issue of the bulletin under review.

Taking another case, we find *Leersia* (*Homalocenchrus*) *virginica* recorded, in southeastern Pennsylvania, from Northampton, Bucks, Philadelphia, Delaware, Chester, Lancaster and York counties. The occurrence of this grass in five of these seven counties is based merely upon the statement in Porter's "Flora of Pennsylvania." The other two counties are included on the basis of a single specimen from each: one collected in 1884, the other in 1899. One is therefore led to suppose that no material has been examined to substantiate the existence of the species in five of the counties and that it has not been recently collected in the other two. Nevertheless, the combined collections of the Philadelphia Botanical Club and the University of Pennsylvania show that up to 1922 it had been found in 37 different localities in these same seven counties.

Or, again, *Oryzopsis racemosa,* for which the author lists thirteen records from the entire state. Seven of these are based upon Porter's Flora and two are copied from Keller and Brown's "Flora of Philadelphia and Vicinity." Yet, in the combined collections of the general herbarium of the Philadelphia Academy of Natural Sciences, the Philadelphia

Botanical Club and the University of Pennsylvania the species is represented by 24 actual specimens from as many different localities scattered throughout the state. This dependence upon citations in the literature, especially when gleaned from a work of such questionable accuracy as Porter's "Flora of Pennsylvania," can not but cause wonder in a day when every effort is, or should be, made to verify all printed records, accepting as valid only those based upon available herbarium material.

It may, with some show of justice, be maintained that the author did not wish to convey a distorted impression of distribution by listing all the known localities for each species, since to do so would probably result in much stronger emphasis upon the southeastern counties, where collecting has naturally been carried on most intensively. However, one of the most useful features of any sectional flora is that it serves to throw light upon those areas most in need of exploration, as well as placing on record the results of work already accomplished. Furthermore, if, in addition to the three Philadelphia herbaria previously referred to, material had been cited from other collections within the state, notably those of the Carnegie Museum at Pittsburgh, we should have for each grass a record of occurrence which would be of real value to the student of distribution. A single example must suffice in this connection.

Ignoring the eight counties from which it is cited solely on Porter's authority, we find *Danthonia compressa* recorded, on the basis of herbarium material, from only three counties. If to these be added the material from the Carnegie Museum (some of it collected by Dr. Gress himself) as well as the three Philadelphia institutions we obtain a grand total of 42 localities from thirteen counties, as opposed to three localities from three counties. Now, if these 42 stations be plotted on an outline map of the state we notice an interesting fact: the species appears to be absent from the Valley and Ridge Province in the south-central portion of Pennsylvania. It may be that, due to some factor influencing its distribution, it really does not occur in that area, or it may be that it grows there but that collectors have neglected it. In either case the fact of its absence from a given region—a fact brought out only by accurate statement of its known dispersal—is a matter of some interest.

One further point seems deserving of mention, namely the fact that the author only occasionally includes a statement as to the degree of frequency of a species. A few grasses are noted as rare, a few more as too common to warrant enumeration of localities, but for the great bulk of species it is left to the reader to form his own conclusions from the number of records given in the paragraph of distribution, a method which is not always reliable.

Here, then, is a work which, as an introduction to one of the most fascinating of plant families, is highly commendable, but which, as a treatise on the distribution of the grasses of Pennsylvania leaves much to be desired.

J. M. F.

Flora of Richmond and Vicinity[1]

This admittedly popular treatment of the flora of Richmond, Virginia, one which omits grasses, sedges, rushes and trees, is to be regarded as an important first step in the direction of a more comprehensive study of the flora of the entire state.

Ever since the days of John Clayton the flora of Virginia has, with the exception of a few scattered and locally restricted efforts, been very largely neglected. Even Clayton's activities centered chiefly in and about Gloucester County and were concerned, for the most part, only with the study of the coastal plain element as represented in the eastern section of the state.

Now, sponsored by the Committee on Virginia Flora, there is a concerted attempt to prepare an exhaustive survey of the flora of the state and the publication here reviewed was issued as a local study which it is hoped will stimulate the interest and enlist the aid of amateur botanists in the vicinity of Richmond as well as elsewhere throughout the state.

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[1] Flora of Richmond and Vicinity. By Paul R. Merriman. Published by the Virginia Academy of Science. Richmond, Va. 1930. $2.00 bound, $1.50 unbound.

The volume is of convenient pocket size, is attractively printed and contains 53 pages of line drawings illustrating the more important species. The analytical key to families, unlike those of many popular works, is largely natural, rather than artificial, so that the beginner, by frequent use, will acquire a certain familiarity with the natural sequence and a feeling for the underlying criteria upon which classification is based. About 700 species are included, chiefly from Henrico and Chesterfield counties, augmented by occasional records from adjoining counties, especially those to the southwest. Each species is described with a minimum of formidable terminology, and such technical terms as are indispensable are defined in a glossary.

One unfortunate feature of the work is the somewhat inconsistent treatment of keys to genera and species. The larger families are provided with generic keys, but this is not the case in those families with less than five genera. Here the student must rely entirely upon the descriptions and text figures to lead him to the correct genus. While such a course renders it entirely possible to separate, for example, *Iris* from *Sisyrinchium*, it will scarcely enable the beginner to differentiate between *Rumex* and *Polygonum*. A careful comparison of the descriptions of these two latter genera reveals no single distinguishing character which can be relied upon to separate them. The only suggestion of a distinction lies in the statement, for *Rumex* of a "perianth of 6 sepals or calyx lobes in 2 differing whorls," as opposed to "perianth of 4–6 sepals, these often petaloid," for *Polygonum*. However, even this is misleading, since *Polygonum* actually has 5, or rarely 4, sepals, and may be easily separated from *Rumex* on that character.

A similar situation prevails when it comes to differentiating species. The larger genera are supplied with specific keys, but in many genera, some of them of a critical nature, like *Habenaria, Cerastium, Brassica, Sisymbrium, Rubus, Poten-*

tilla, Agalinis and *Bidens,* the student is dependent upon descriptions which, while admirably concise and simple, are not always diagnostic. A more helpful method would have been the inclusion of keys for all groups.

Accompanying each species is a statement of its preferred habitats and time of flowering. One looks in vain, however, for some indication of its geographic distribution within the area treated. The author may have considered this out of place it in a non-technical work, but, certainly, to know that a plant is rare and local or that it is to be looked for only in a certain region adds much to the zest of collecting.

The volume is one which all who are interested in the flora of Virginia will wish to possess. It is to be hoped that it is the precursor of similar or more pretensive treatments dealing with other sections of the state.

J. M. F.

Wild Flowers of the Alleghanies[1]

As a popular account of the more conspicuous plants of the Alleghany Mountains this work possesses many admirable features. Although not of convenient size for carrying into the field, it is a book which every botanist who visits the Alleghanies to observe or collect will wish to have with him.

The illustrations are worthy of special mention. Over 400 figures from line drawings, executed by Mr. F. Schuyler Matthews, illustrate individual species, leaf characters, types of inflorescence and details of floral structure. In addition, there are eight fine colored plates reproduced from paintings by Mr. Matthews or Miss Mary Eaton.

One feature of the work which is sure to attract attention is the illustrated key to families. This consists of detailed drawings of the chief distinguishing leaf and floral characteristics of 95 of the most important families, arranged in the natural sequence, each accompanied by a brief description. By running through this visual key, with an unknown specimen before him, the student will in many cases be able to place the plant in its proper family. That this method is not infallible may be assumed from the fact that usually only one type is illustrated for each family. It may, therefore, be doubted whether the beginner who has found an *Aquilegia*, an *Aconitum* or a *Thalictrum*, and who is unaware of the wide range of variation within the Ranunculaceae, would succeed in locating his plant by means of this key. Nevertheless, the feature is a distinctly helpful one and if published separately, in pamphlet form, would doubtless find use among high-school students and nature clubs. In addition to this illustrated key there is supplied an analytical key to families.

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[1] Wild Flowers of the Alleghanies. By Joseph E. Harned. Published by the author. Oakland, Maryland. 1931. $4.50.

The lover of flower lore will find this book replete with legend, poetic allusion and data on medicinal properties, while for the fern enthusiast there is appended a check-list of ferns and fern allies found in the Alleghanies.

Due to the popular nature of the work, grasses, sedges and rushes have been omitted. Trees are somewhat inconsistently dealt with, such characteristic plants as poplars, hickories, birches, oaks, elms, tulip tree and ashes being left out, while magnolias, hawthorns, cherries, hollies, maples and lindens are included.

Viewed as a contribution to our knowledge of the flora of the Alleghanies, Mr. Harned's treatment is disappointing. The student of plant geography will look in vain for some reference to the fact that the area dealt with contains one of the oldest and, from an evolutionary standpoint, most interesting floras found on the continent of North America. The close relationship of many Alleghanian genera and species with their Asiatic representatives—a relationship which has intrigued botanists ever since the time of Asa Gray—is nowhere hinted at.

Even when taken as a guide to the distribution of plants within the area which it covers, the book is far from satisfactory. Unfortunately the author does not define the boundaries of the territory which he is treating. This is especially to be regretted in view of the fact that there is no unanimity of opinion, even among geologists, as to the correct application of the term "Alleghanies." By some, it is made to include the Blue Ridge as well as the Cumberlands; by others, it is restricted to the mountains of south-central Pennsylvania, western Maryland and West Virginia. The reader is left to infer, simply from the rather small number of species included by Mr. Harned, that he is employing the term in its more limited sense. Yet, even from this restricted region, it would seem that many plants are omitted which have a characteristic Alleghanian distribution.

It cannot, of course, be expected of the author of a popular treatise on wild flowers, that he fill his pages with excessive data on natural ranges, phytogeographic relationships and the minutiae of distribution. His main interest should be to stimulate and aid the beginner and to inculcate a knowledge of and love for the wild plants of his area. Judged in this light, the present volume should be deservedly popular and successful.

If, on the other hand, some effort were made to indicate the outstanding problems underlying the distribution of the Alleghanian flora, it is scarcely conceivable that those who had previously observed plants merely with an eye to their beauty or from a desire to know their names, could fail to take a deeper interest in the vegetation about them. To know, for example, that the Alleghanies support one of the most ancient living floras in the world; to be told, with illustrative species, that there is a tongue of vegetation emanating from the so-called Canadian life zone, which extends southwestward, following the higher Appalachians, all the way to Georgia and Alabama; to realize that many of the plants of the Alleghanies are more closely related to those of southeastern Asia than to those of any other part of the globe and to be shown just why this is so: all this, it is believed, will imbue even the casual study of wild plants with a new and deeper significance.

J. M. F.

Eugene A. Rau

On October 16, 1932, the Club lost, through the death of Eugene A. Rau, of Bethlehem, Pa., a member whose name was added to its list only a few years ago, but who was known to the botanical world for many years and was in close touch with the Botanical section of the Academy in the days of John H. Redfield and Charles F. Parker.

Mr. Rau was born in Bethlehem, Pa., July 22, 1848. His father was a prominent druggist there and his maternal grandfather was a Moravian missionary among the Delaware Indians in Ohio and in Canada.

His early education was received in the Moravian Day School in Bethlehem, Pa. After a period spent as clerk in his father's drug store he attended the Philadelphia College of Pharmacy, from which institution he graduated in 1869. He entered, in 1871, the firm of Simon Rau & Co., the oldest drug shop in America. This business is still in operation although it has passed to other ownership.

Mr. Rau always claimed that he owed his introduction to the study of botany to Dr. A. L. Huebener, of Bethlehem. In 1872 he and Francis Wolle took up the study of Mosses and Hepaticae and received much ancouragement and assistance in this work from Mr. C. F. Austin. Among the rarer mosses he collected may be mentioned *Discelium nudum* Brid. which he discovered for North America May 19, 1873, near Bethlehem. His study of the distribution of *Sphagna* revealed a number of varieties not hitherto reported and a number of additions to localities in Pennsylvania, New Jersey and Florida. In 1884 he reported the discovery of *Helonias bullata* L. at Budd's Lake, Morris County, New Jersey. His interest in mycology is evidenced by the fact that his specimens are quite numerous in the Ellis and Everhart collection of North American fungi, although he wrote little in this particular field of botany.

In 1928, Mr. Rau presented his herbarium of several thousand specimens especially rich in mosses, lichens and algae to the New York Botanical Garden. Shortly before his death he left an oral request that the remainder of his botanical effects, which included a very valuable collection of books and other publications, be donated to the Academy of Natural Sciences. This request was most graciously complied with and the Academy and department shelves enriched to a considerable extent.

Mr. Rau was extremely modest and retiring in manner yet very positive in his convictions. His interests were many and varied. In addition to his business and scientific activities he was interested in church and educational activities. He was for forty years a trustee of the Moravian Seminary and College for Women and was Vice President of the Moravian Historical Society.

He appears to have been author, or co-author, of the following scientific papers:

(1) On the active principle of *Catalpa bignonioides.* Amer. Jour. Pharm. 42: 204–206. 1870.
(2) *Epiphegus virginiana* Bart., var. *rauana* Austin. Coe F. Austin and Eugene A. Rau. Bull. Torrey Bot. Club 6: 65. 1875.
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(10) *Helonias bullata* in Northern New Jersey. Bot. Gaz. 9–10: 113. 1884.
(11) Review of Lesquereux and James' "Manual of the Mosses of North America." Bot. Gaz. 9–10: 151. 1884.
(12) A Lichen new to the United States. Jour. Mycol. 4: 20. 1888.
(13) List of Kansas Mosses. Bulletin of Washburn College, Topeka, Kan. 1–2: various pages. 1884–1890.
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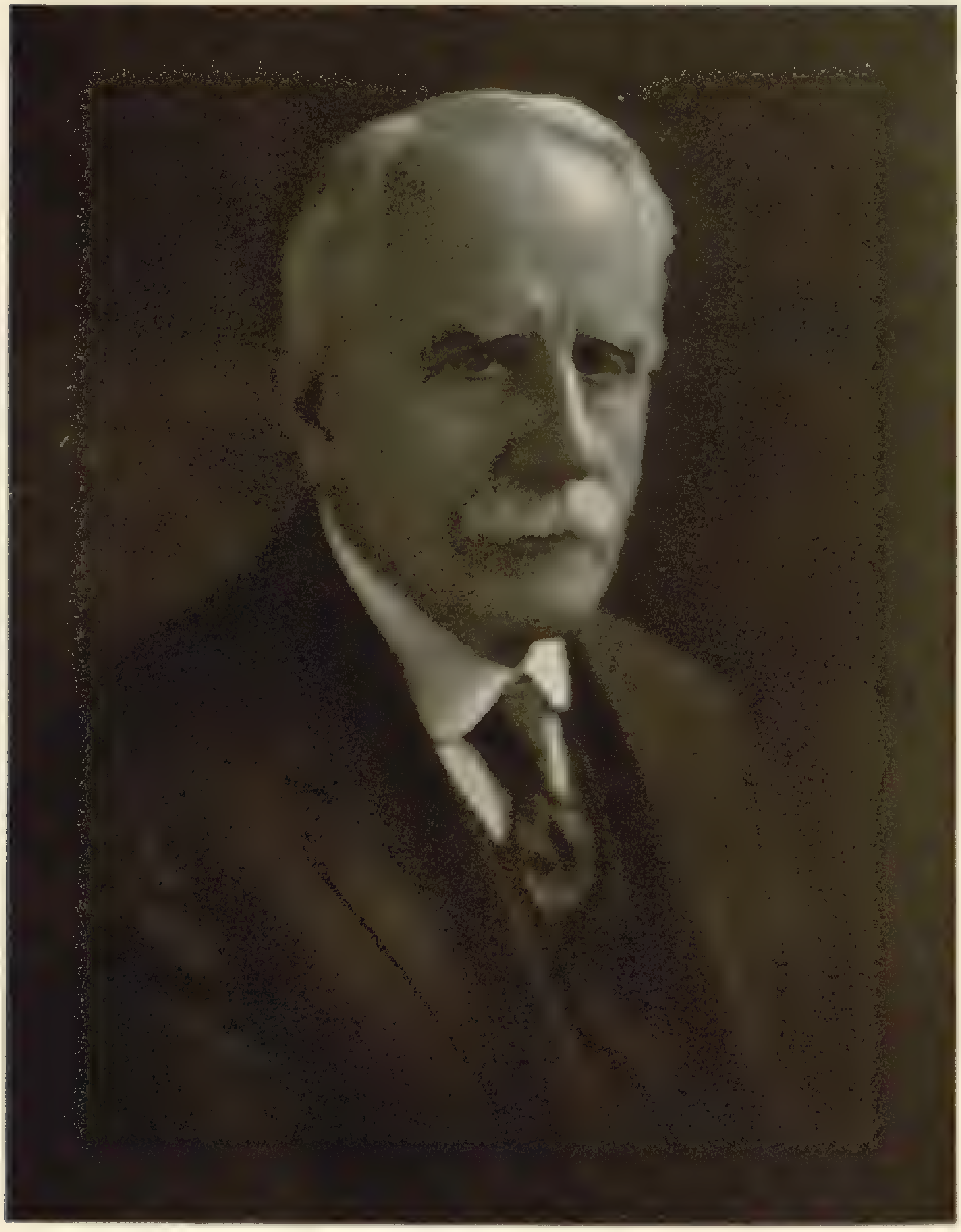
W. M. Benner



DR. JOHN W. ECKFELDT

(A recent photograph supplied by kindness of Mr. Rodman Fraser)

John W. Eckfeldt, M.D., 1851-1933

When I first came to the Academy in 1888 I frequently noticed a short, quiet man visiting the herbarium across the hall from my room and examining the case containing the lichens. In my botanical studies I had attempted to gain some knowledge of all the groups and had collected a number of lichens although I had been unable to name them. The next time the visitor came I had my specimens there and took them to him for assistance. He gladly named them all and expressed both surprise and pleasure that I had shown any interest in such plants, for students of lichens, he told me, were very few.

Such was my first meeting with John W. Eckfeldt and for many years I saw a good deal of him at the herbarium and later, after his retirement from medical practice, he accompanied me on several trips to the pine barrens of New Jersey when I was collecting data for my report on the flora of the region. Always a cheerful companion and a thorough gentleman, this companionship has ever been a delightful recollection. His enthusiasm in the field was contagious and stimulating and his knowledge of botany impressive.

Dr. Eckfeldt was born in Philadelphia on January 29, 1851. His father, Jacob R. Eckfeldt, was Assayer in the United States Mint at Philadelphia where his grandfather had been first coiner. His mother was Emily Levering. He was educated in the public schools, Friends' Central School and Lauderback Academy and entered the medical school of the University of Pennsylvania in 1869, graduating on March 12, 1872.

Until the autumn of 1880 he followed his profession at Haverford, Pa., and then moved back to Philadelphia where he developed a large practice in the Haddington district. He was a general practitioner, one of the old family doctors, a type fast disappearing today, and it has been estimated that he walked 35,000 miles in visiting his many patients, while he brought several hundred children into the world.

In spite of his absorbing medical work he found time for the study of history and nature, being an authority on the paper mills, bridges and ancient buildings of his home district, about which old landmarks he published a little book.

In natural history his interests, developed early in life, centered upon entomology and botany, and were later concentrated upon the latter and finally on the much neglected field of the Lichens, upon which group he became an authority second only to the pioneer in his group in America, Dr. Tuckerman.

He studied the material at the Academy, including the Schweinitz herbarium, and identified collections made by U. S. Government expeditions and by collectors in various parts of North America and South America.

Failing eyesight and consequent inability to use the microscope compelled him to give up his specialty and he returned to the field study of the flowering plants, enjoying many an excursion with members of the Philadelphia Botanical Club.

His collection of Lichens numbering upwards of 4000 specimens and nearly 2800 species, said to have been the most complete in America, was presented to the Academy of Natural Sciences of Philadelphia in April, 1898, while his collection of ferns, including some 300 species, went to the Botanical Department of the University of Pennsylvania and is now housed at the Morris Arboretum.

Although active until late in life Dr. Eckfeldt's health at last failed and he died after a lingering illness on October 5, 1933, at his late residence in Brookline, just west of Philadelphia. His wife, Harriet Eckfeldt, and one son survive him.

Dr. Eckfeldt was a member of the Academy of Natural Sciences of Philadelphia; Philadelphia and Delaware County Medical Societies; West Philadelphia Medical Club; Torrey Botanical Club of New York; Philadelphia Botanical Club; Medico-Chirurgical Hospital (life member); Alumni Society of the University of Pennsylvania and the Medico-Chirurgical College; City History Society; and Historical Society of Delaware County.—WITMER STONE.

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Botanical Notes. Bull. Torrey Bot. Club 18: 257, 1891.
About *Alectoria cetrariza,* n. comb., a lichen new to the United States.

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New combinations in *Placodium, Buellia* and *Graphis.*

Lichens, in W. E. Meehan's 'A Contribution to the Flora of Greenland.' Proc. Acad. Nat. Sci. Phila. 45: 215–216, 1893.

List of Lichens from California and Mexico, collected by Dr. Edward Palmer from 1888–1892. Contr. U. S. Nat. Herb. 1: 291–292, 1893.

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Describes eight new species from Mexico and one from Louisiana.

Lichens in J. K. Small & A. M. Vail's 'Report of the Botanical Exploration of southwestern Virginia during the season of 1892.' Mem. Torrey Bot. Club 4: 196–200, 1894.

An Enumeration of the Lichens of Newfoundland and Labrador. Bull. Torrey Bot. Club 22: 239–259, 1895.
New species in *Pannaria, Lecanora, Biatora* and *Lecidea.*

General Notes

Local Interests. During the season of 1933 Mr. Long and Dr. Fogg have made extensive and important collections on the eastern side of Delaware Bay, mainly in Cumberland County, New Jersey. Progress continues steadily in the task of mounting and incorporating the large accumulation of previous specimens gathered by the Club's Curator. A recent estimate shows that there are about 103,000 sheets of mounted specimens in the Local Herbarium.

Dr. Darlington and the State Medical Society. In a note on page 61 of our last issue it was stated that Dr. Sharpless was the first physician of Chester County to be president of the Medical Society of the State of Pennsylvania since the tenure of that office by Dr. William Darlington. As on page 7 the founding of the state association was mentioned as an outgrowth of a resolution made in 1847 by Darlington's pupil, Dr. Wilmer Worthington, it is not surprising to learn that the editor's note was incorrect. Dr. Darlington was never president of the state society, but from Dr. Worthington's presidency about 1850 till that of Dr. Sharpless in 1928 the office had never chanced to be filled from Chester County.

Programs of Meetings during 1932

Date	Subject	Speaker	Attendance
Jan. 28	Tropical Plants and Flowers	Charles R. Toothaker.	
	Insectivorous Plants of our Local Flora	Dr. Edgar T. Wherry	34
Feb. 25	On the Trail of John Bartram	Prof. Rodney H. True.	
	Local Species of *Populus*	Bayard Long	42
Mar. 24	Plant-Collecting from the Atlantic to the Pacific	Dr. Edgar T. Wherry	45
Apr. 28	Features of the Flora of Lassen National Park	Frederick J. Hermann.	
	Salt-Marsh Plants of Central New York	Dr. Robert R. Tatnall	31
May 26	Mushrooms, Edible and Poisonous	G. G. Nearing	34
Sept. 22	Reports of Summer Work by	Members	21
Oct. 27	A Botanist in Sicily and Italy	Dr. John M. Fogg, Jr.	39
Nov. 17	Plant and Animal Life of the Sacramento Mountains, New Mexico	Wharton Huber	39
Dec. 22	Hollies	G. G. Nearing	30

Officers and Members of the Philadelphia Botanical Club, 1933

EDGAR T. WHERRY, *President*
HARRY W. TRUDELL, *Vice-President*
ROBERT R. TATNALL, *Secretary*
ARTHUR N. LEEDS, *Treasurer*
BAYARD LONG, *Curator*

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A. G. Alderfer, Sellersville, Pa.	1932
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J. Russell Bebler, 135 E. Phil Ellena St., Germantown, Phila.	1919
Don M. Benedict, Temple University, Philadelphia	1932
Dr. Walter M. Benner, 5636 Loretta Ave., Frankford, Phila.	1912
Carl E. Bliss, 65 Randolph Place, South Orange, N. J.	1924
Carl Boyer, Wagner Institute, 17th St. & Montgomery Ave., Phila.	1926
J. Claudius Boyle, 223 Kenmore Road, Brookline, Pa.	1919
Dr. Herman A. Burgin, 212 High St., Germantown, Phila.	1915
Milton Campbell, 4401 Pine St., Philadelphia	1928
Prof. M. A. Chrysler, Rutgers University, New Brunswick, N. J.	1931
F. Van Buren Connell, 500 Homewood Ave., Narberth, Pa.	1924
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Mrs. T. B. Dallas, 306 W. Springfield Ave., Chestnut Hill, Phila.	1933
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Robert R. Dreisbach, 410 Jerome St., Midland, Mich.	1922
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Mrs. Edward W. Evans, 6014 Chew St., Germantown, Phila.	1932
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Dr. John M. Fogg, Jr., University of Pennsylvania, Phila.	1921
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Howard K. Henry, 1464 Grayton St., Penn Wynne, Pa.	1932
Mrs. J. Norman Henry, Gladwyne, Pa.	1932
Frederick J. Hermann, Temple University, Philadelphia	1932
F. F. Huber, Pennsburg, Pa.	1911
Miss Clara Kast, 2004 Spring Garden St., Philadelphia	1932
William R. Keeney, 318 E. Lancaster Ave., Wayne, Pa.	1930
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Miss Natalie B. Kimber, 538 E. Locust Ave., Germantown, Phila.	1928
Rev. William U. Kistler, 118 Main St., Pennsburg, Pa.	1911
Prof. W. A. Kline, Ursinus College, Collegeville, Pa.	1911
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Dr. Henry A. Laessle, 5900 Market St., Philadelphia	1894
Dr. Charles H. La Wall, 214 S. 12th St., Philadelphia	1896
Arthur N. Leeds, 5321 Baynton St., Germantown, Phila.	Founder
Morris E. Leeds, 5321 Baynton St., Germantown, Phila.	Founder
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T. Chalkley Palmer, Media, Pa.	1927
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Harold W. Pretz, 123 S. 17th St., Allentown, Pa.	1909
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Dr. W. H. Reed, Jeffersonville, Pa.	1892
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Dr. D. Walter Steckbeck, University of Pennsylvania, Phila.	1925
Hugh E. Stone, Haverford, Pa.	1892
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Mrs. Kenneth E. Stuart, 367 Baird Road, Merion, Pa.	1933
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Arthur H. Thomas, Haverford, Pa.	1928
Mrs. W. Hersey Thomas, 145 E. Gorgas Lane, Mt. Airy, Phila.	1929
Horace E. Thompson, 5016 Schuyler St., Germantown, Phila.	1920
Harry W. Trudell, 2030 E. Madison St., Philadelphia	1915
Prof. Rodney H. True, University of Pennsylvania, Phila.	1925
Clarence E. Varnum, Atco, N. J.	1922
Robert F. Welsh, 132 S. 4th St., Philadelphia	1909
Dr. Edgar T. Wherry, University of Pennsylvania, Phila.	1925
Edward J. White, 7124 Cresheim Road, Mt. Airy, Phila.	1931
Dr. Edward E. Wildman, 4331 Osage Ave., Philadelphia	1931

Hans Wilkens, 241 S. 11th St., Reading, Pa.	1928
Miss Virginia Wismer, 2 Center Ave., Willow Grove, Pa.	1933
William H. Witte, 16 York St., Camden, N. J.	1898
Miss Mary F. Wright, Boxwood Farm, Ambler, Pa.	1928

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Dr. Joseph S. Illick, Mont Alto, Pa.	1925
Samuel S. Van Pelt, 59 Bethlehem Pike, Chestnut Hill, Phila.	1902

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Mrs. Elizabeth G. Britton, N. Y. Botanical Garden, New York City	1895
Dr. Nathaniel Lord Britton, N. Y. Botanical Garden, New York City	1892
Otway H. Brown, 1048 Washington St., Cape May, N. J.	1908
Stewart H. Burnham, Cornell University, Ithaca, N. Y.	1911
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Dr. A. Arthur Heller, Chico, Calif.	1893
Dr. Harold St. John, University of Hawaii, Honolulu, T. H.	1927
Charles F. Saunders, Pasadena, Calif.	1893
Dr. John K. Small, New York Botanical Garden, New York City	1893
Dr. William Randolph Taylor, University of Michigan, Ann Arbor, Mich.	1921
Dr. Campbell E. Waters, Washington, D. C.	1904
Dr. H. W. Youngken, Massachusetts College of Pharmacy, Boston, Mass.	1918

RECENTLY DECEASED MEMBERS

	Died
Wharton B. Aucott, Active	Mar., 1932
George W. Bassett, Honorary	Aug. 30, 1932
Dr. John W. Eckfeldt, Active	Oct. 5, 1933
Dr. Edward I. Keffer, Active	Mar. 17, 1933
Dr. Ida A. Keller, Active	Sept. 11, 1932
Eugene A. Rau, Honorary	Oct. 16, 1932

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No. 16 1934

BARTONIA

PROCEEDINGS OF THE PHILADELPHIA BOTANICAL CLUB

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T. CHALKLEY PALMER
(1860–1934)

BARTONIA

PROCEEDINGS OF THE PHILADELPHIA BOTANICAL CLUB

No. 16 PHILADELPHIA, PA. 1934

The Botanist Schweinitz and His Herbarium

FRANCIS W. PENNELL

Sesquicentennial dates crowd upon us. 1930 was the 150th anniversary of the birth of Schweinitz, 1935 is that of Rafinesque, and 1936 will be that of Nuttall; the work of all of these must receive renewed consideration in BARTONIA, for all were factors in the scientific life of Philadelphia and its vicinity. Consideration of Schweinitz seems overdue, but reasons have been found to change a sesquicentennial into a centennial celebration, appropriate to the year of 1934 for which this number of BARTONIA is issued.

For it was in 1834 that Schweinitz died and his large herbarium reached the Academy of Natural Sciences of Philadelphia. So extensive was it that the Academy's previous herbarium was simply added to the Schweinitz series. Just what this amalgamation meant and just what was "the neat and judicious manner of Mr. Schweinitz," under which the combined collections were then arranged will be one of the later inquiries of this paper. But now let us follow the career of this versatile scientific pioneer.

Lewis David von Schweinitz, "Doctor of Philosophy, Senior Civilis of the Unitas Fratrum, Member of the Provincial Board of its American Province, Administrator of its Southern and Administrator of its Northern Estates in America, Senior Pastor of the Church at Bethlehem, Pa., Member of the Academy of Natural Sciences of Philadelphia, Member of the American Philosophical Society, Corresponding Member of the Linnaean Society of Paris and the Society of Natural Sciences of Leipzig," as a manuscript[1] before me calls him, was born at Bethlehem, Northampton County, Pennsylvania, on February 13, 1780. He bore two names which had already been distinguished in his ancestry, that of Lewis being from his great-grandfather Nicholas Lewis Count Zinzendorf, the founder of the Unitas Fratrum or Moravian Brethren. His father was in 1780 in charge of the fiscal and secular concerns of the Brethren in America.

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[1] Account of Lewis David de Schweinitz most generously copied for me by Miss Adelaide L. Fries, Archivist of the Moravian Church in America, from a manuscript "History of the Family of the von Schweinitz," by Bishop Edmund de Schweinitz, a son of Lewis David.

It was in a religious atmosphere that young Schweinitz developed, and how largely his life was given to the cause of his church is evident from the enumeration of his later positions. It is not the purpose of the present account to follow this dominant portion of his activity, but through his career to trace the thread of his scientific interest. Botany was an avocation, but it was one that he made singularly productive.

As a boy of seven he was sent to Nazareth Hall, in the Moravian community near Bethlehem, where he remained for ten years. His awakening to botany was dated, according to the Biographical Sketch published by the Academy of Natural Sciences soon after his death, to a visit to Nazareth Hall even earlier than his admission, when "it chanced that a specimen of the *Lichen digitatus,* lying on a table in one of the apartments of the school, attracted his attention, and led to a few observations on its name and physiology." One suspects that the remarks were made by Samuel Kramsch, who was soon his instructor when enrolled at the school. According to the same Sketch "A partial flora of Nazareth and its vicinity, formed at this early period, is still among his manuscript papers"; this I have not seen, and I am inclined to doubt the accrediting of such a florula to young Schweinitz because there was later in his possession just such a local flora written by Mr. Kramsch. This was one of the Schweinitz manuscript books presented to the Academy so late as 1931 by the late Bethlehem botanist, Eugene A. Rau.[2] In fact there were two small booklets, a "Flora Nazarethana spontanea collecta in annis 1787 & 1788 a Sam: Kramsch" with a "Supplemento addito anno 1797 a Christn Denke"; and an "Index Florae Nazarethaneae," which was an index to the preceding. Kramsch's original Flora of Nazareth, a Latin work on the contemporary Linnean arrangement, would seem to have been written before young Schweinitz was ten years old; Denke, who was five years older than Schweinitz and had also been Kramsch's pupil, made his supplement soon after commencing his own teaching career at Nazareth Hall in 1796. Schweinitz and Denke were lifelong friends, and one suspects that the gifted student contributed many entries to the young instructor's catalogue.

In 1798 the Schweinitz family moved to Germany, and Lewis David entered the Moravian Theological Seminary at Niesky in Silesia (Lusatia). There he came under the influence of "a very learned theologian and scientist," Professor Johannes Baptista von Albertini. Together they gave their available time to the collecting and study of Fungi, working industriously and with the thorough study that led to the first scientific recognition of many new species. It was Schweinitz' induction to what would now be termed "original research." The result of their labors was the first of Schweinitz' ten published botanical works,[3]

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[2] See "Gift of Schweinitz Record-books," in Bartonia 13: 50–52. 1932.

[3] As listed in an appendix to Walter R. Johnson's "A Memoir of the late Lewis David von Schweinitz, P. D. with a Sketch of his Scientific Labours, read before the Academy of Natural Sciences of Philadelphia, May 12th. 1835." This memoir and the excerpt from the Schweinitz family history have been my sources of information for his life.

Albertini and Schweinitz' "Conspectus Fungorum in Lusatiae superioris agro Niskiensi crescentium. E methode Persooniano," issued at Leipzig in 1805, for which the twelve plates were drawn, engraved and colored by the junior author. A subtitle announced that the work included 93 species new to science, so no wonder the names of the authors soon became known to the scientific world.

In 1807 he left Niesky for the first of the many positions that called forth his abilities as an executive and organizer, the superintendency of the single brethren at Gnadenburg, in Silesia. He had already commenced his life labor as a Moravian preacher. It was the time of the Napoleonic invasions of Germany, and he seems to have been remarkably tactful, my accounts speaking of "his conciliatory and genial ways." Indeed, these traits, with humor and high conversational powers, were his throughout life.

Church work in Saxony followed, and then in 1812 he was appointed to the responsible post of "Administrator of the Church Estates in North Carolina." Before leaving Germany he was married at Niesky to a young lady of French Huguenot ancestry, the union being effected by Professor Albertini. Schweinitz continued in scientific and presumably ecclesiastical touch with his beloved instructor, for Albertini became a bishop and eventually head of the entire Moravian Brethren.

The journey across the ocean was long and exciting, made so by storms and by the fear of capture because in addition to the prolonged French and English struggles the United States had also declared war against England. Embarkation was achieved by going from Germany to Sweden, and on the way Schweinitz had a prolonged stop in Kiel; it was the acquaintanceship made then that led to the University of Kiel conferring upon him the degree of Doctor in Philosophy. The "Minerva Smith" landed safely in New York, and Schweinitz had returned to a new world that was almost unknown mycologically.

Schweinitz' stay in North Carolina was only for nine years, and from these a year (1817–18) must be deducted for a visit to Germany. Busily engaged in the affairs of the Church, with his headquarters in the pleasant town of Salem, his diligence found time for an amazing amount of botanical work in that portion of North Carolina. He composed a "Flora Salemitana," which, left unpublished, was the most considerable of the manuscript works given us by Mr. Rau;[4] the subtitle stated that the area covered the country within a radius of thirty miles, in the counties of Stokes, Surry, Guilford, Rockingham, and Rowan. These, when interpreted into yet more counties of the modern map of North Carolina, show the territory covered by Schweinitz, while from a list of the actual localities mentioned in it Dr. P. O. Schallert, a present botanist of Salem, has built up his detailed account of Schweinitz' collecting localities in North Carolina. The scope of this manuscript shows the extent of the botanist's interests; it listed both species of "Phaenogamia" and "Cryptogamia," and under the latter the classes of ''Filices,'' ''Musci,'' ''Algae aquaticae aquae dulcis,'' and ''Lichenes,'' the Fungi being omitted only because of the special treatise in formation on this favorite group. Under all these headings not only were species listed by old names, but those new to science were freely described. It is indeed unfortunate that the new descriptions in this work remained permanently unpublished.

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[4] For fuller account of this see Bartonia 13: 51. 1932.

Two studies were actually published, based upon Schweinitz' work in North Carolina. One, the second of Johnson's bibliographical list, was his ''Synopsis Fungorum Carolinae superioris secundum observationes Ludovici Davidis de Schweinitz, Soc. Nat. Cur. Lips. Sodalis, etc.,'' edited by C. F. Schwaegrichen and published at Leipzig, Germany, in 1818;[5] the manuscript of this had been taken to Germany. The other, the third of Johnson's list, was entitled ''Specimen Florae Americae Septentrionalis Cryptogamicae, sistens muscos hepaticos hucusque in Am. Sep. observatos,'' and appeared in pamphlet form at Raleigh, North Carolina, in 1821; its alternative title gives an English explanation of its scope: ''Specimen of a systematic arrangement and description of the cryptogamous plants of North America, comprising a diagnostic description of all the hepatic mosses hitherto observed in North America, with ampler descriptions of a number of new species.'' The last title gives evidence that Schweinitz thought of undertaking an exceedingly comprehensive account of North American cryptogams, and it is significant that both these North Carolina papers treat of these then scarcely known plants. The correctness of this inference is borne out in his letter to Dr. John Torrey under date of January 11, 1821, where he spoke of this project ''as a kind of second part to Pursh''[6] and estimated that it would comprise nearly 2,500 species.[7]

One shorter paper, the fourth on Johnson's list, was written before leaving North Carolina, and was published in 1821 in the American Journal of Science, then usually called, from its great editor, Silliman's Journal. This dealt with a group of flowering plants, and was entitled: ''Attempt of a monography of the Linnaean Genus Viola, comprising all the species hitherto observed in North America.'' This critical group was thought quite small by the youthful Torrey, who in a letter stated that there are only about 7 or 8 species in the Northern States, whereas his senior Schweinitz remarked in 1822 after arriving in Bethlehem that ''most of the common species here are entirely different from those in N. Carolina.'' This gives a clue to the contrast in critical temperament between the two young men; Torrey's opinion, probably almost wholly formed on herbarium study, was to prevail in his and Gray's books, limiting our supposed species of violets to a few, though ultimately Schweinitz' opinion, based more largely on field-knowledge, has found ample response in the increased number of species admitted to modern treatments of *Viola*.

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[5] Schrift. Naturf. Gesellsch. Leipzig **1**: 21–131. 1822; and also reprinted separately.

[6] Flora Americae Septentrionalis, 750 pages, London. 1814. This was the standard North American flora at the time of Schweinitz' comment.

[7] Letter published in ''The Correspondence of Schweinitz and Torrey,'' in Mem. Torrey Bot. Club **16**: 133–135. 1915.

It was in December, 1821, that Schweinitz made his last change of residence, being called to yet more important service as Senior Pastor at Bethlehem, his home town in Pennsylvania, and as Administrator and subsequently Proprietor of the Moravian Church Estates in the North. His scientific life can be followed rather intimately through the published letters to Torrey, although there are many lapses for which one or the other will be begging forgiveness. Five more papers, numbers 5 to 9 of Johnson's bibliographical list, followed in the short interval between 1823 and 1825. These were: "A Catalogue of Plants, collected in the Northwestern Territory, by Mr. Thomas Say, in the year 1823," published in Keating's "Narrative of [Long's] Expedition to the Source of St. Peters River, Lake Winnepeek, Lake of the Woods, etc." 2: 379–400. 1824; an "Analytical Table to facilitate the determination of the hitherto observed North American species of the genus Carex," in Ann. Lyceum Nat. Hist. New York 1: 62–71. 1824; "List of the rare plants found near Easton, Pennsylvania," in Amer. Journ. Sci. 8: 267–269. 1824; "Monograph of the North American species of the genus Carex," in Ann. Lyceum Nat. Hist. New York 1: 283–373. 1825; and "Description of a number of new American species of Spheriae," in Journ. Acad. Nat. Sci. Philadelphia 5: 3–16. 1825. The report on Say's small collection of flowering plants from Long's second expedition was undertaken only because of the absence of Nuttall on a trip to Europe. The list of plants near Easton included about 150 species observed "principally on the shady rocks up the Delaware, or on the rocks at the mouth of the Lehigh." While speaking of Schweinitz' local interest in the flora of the Bethlehem section of Pennsylvania, a matter of special interest to us because this lies within the area of the present Herbarium of the Philadelphia Botanical Club, I must call attention to the marginal entries systematically made in his manuscript "Flora Salemitana" and mentioned on its title-page as "In margine additas invenies Plantas quae ex Bethlehem Pensylvania loco natali observatur." It is evident that the busy man of middle years turned with keen zest to botanizing again in the scenes of his youth. The remaining papers of this period show Schweinitz in more critical vein. Two of these concern *Carex,* the largest and most difficult genus of North American plants; it is typical of Schweinitz' zeal for problems that his two monographs of flowering plants should have treated *Viola* and *Carex.* The last of these papers continued his pioneer descriptive study of Fungi, and of this small contribution covering 20 species 15 were new to science.

After 1825 Schweinitz labored under a heavier burden of official duties, but what time he could obtain began to be given to his last work, a synopsis of all the Fungi hitherto known from North America. His first mention of this to Torrey was in a letter of April 11, 1828, telling how the latter part of the preceding winter he had been working upon it. Then came Schweinitz' first serious attack of ill health, which he says to Torrey, under date of May 4, 1831, "from the time I received yours [of May 1, 1830] to within about two months past entirely disabled me from any exertion whatever.'' He seems to have been mentally able however for, after recounting various afflictions of body and spirit, he tells how he had been able to complete ''the Synopsis of the American Fungi, containing descriptions of about 1500 new species & remarks upon the whole number of 3000 Am. species as yet observed by me.'' Truly, a magnificent achievement for a sick man! This work, Schweinitz' *magnum opus,* was issued under the title ''Synopsis Fungorum in America Boreali degentium'' in Trans. Amer. Philos. Soc. 4: 141–316. 1832. According to the table accompanying Johnson's Memoir, it contained actually 3098 species, of which 1203 were there described as new to science; these included however the 315 novelties of his earlier North Carolina paper and the 15 of his small study of *Sphaeria.*

Schweinitz' recovery was but temporary, and this great man died February 8, 1834, at the age of 54 years. We need not attempt to give a name to his illness, but a severe cough would suggest the likelihood of its being tuberculosis. Rafinesque mentions him as among the ''victims of tobacco.''[8] By all accounts his was a remarkable personality, and those before me stress his delightful social qualities. ''In social life he was the center of every circle which he entered.'' ''Humor, wit, anecdote and repartee were always at his command.'' He was ''one of the best known and most highly respected ministers in the entire Unity of the Brethren,'' he knew how to associate with men of all ranks, and ''had a large circle of acquaintances both in this country and Europe.''

His herbarium was bequeathed to the Academy of Natural Sciences of Philadelphia, and its arrival was hailed in Johnson's Memoir of 1835. It still remains one of the Academy's most important possessions, for the pioneer work of Schweinitz was on such a scale as to make his collections of Fungi permanently invaluable. These are largely kept in the green portfolio-boxes in which he left them, but their utility for reference has been greatly increased by Ezra Michener's formation of a separate series numbered in the sequence of the ''Synopsis Fungorum in America boreali degentium.'' To that great work the whole collection serves an illustration. A special article will tell us more of Schweinitz' study of Fungi and his material of these plants. His other Cryptogamous collections have been assigned to their phyla and added to the Academy's collections of those groups. So also have been his large series of flowering plants and ferns, but these we must examine with more attention.

Schweinitz' great herbarium of higher plants was begun, according to Mr. Johnson, after his return from Europe in 1818, and, on reaching the Academy, was estimated to contain about 23,000 species of plants, ''either collected by himself, or procured through the agency of his numerous and valuable correspondents.'' The series, when combined with that of the Academy's other collections (among which Nuttall's were much the most extensive and important) amounted to about 28,000 species in all. Dr. Charles Pickering, who later traveled to the

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[8] New Flora and Botany of North America 2: 13. 1837.

Orient and published his elaborate "Chronological History of Plants," had charge of the amalgamation of the two series, so that Mr. Johnson could say that "The whole is now arranged after the neat and judicious manner of Mr. Schweinitz, into scientific order." The specimens were certainly all unmounted, though classified to genus and species, and so they must have remained until after 1876 when Mr. John H. Redfield commenced his great work of mounting and modernizing the Academy's Herbarium. Fortunately Redfield was the most careful of conservators, and we may feel sure that he has preserved for us whatever data could be found upon the folders of the old collections.

Naturally each of the early botanists had developed his own practice, for labels were not then printed or even standardized. In my account of the Barton herbarium[9] I told of the accurate localities given by Pursh; these were written on special hand-cut square slips to serve as labels. The data with Nuttall's specimens were much more vague and meagre; they are often greatly abbreviated and written in his small hand on small square pieces of paper. Schweinitz, to judge from the coarseness of the paper and the irregular sizes of pieces evidently clipped by Redfield so as to contain merely the data given, wrote directly upon the sheet. His hand was of moderate size but with florished initial capitals, and is particularly easy to recognize. As with Nuttall, the data is usually meagre and highly abbreviated.

It is surprising that these two men, both of whom had traveled and had therefore seen at first hand the geographic diversity of vegetation, should have been satisfied to leave so little record of the sources of their material. Nuttall could cross a continent, and be content with "R. Mts." as the datum for his species gathered in what is now southern Wyoming and Idaho; Schweinitz was content to let "Sal" stand for whatever plants he had gathered while at Salem, North Carolina, even though the contemporary record of his "Flora Salemitana" might indicate some peculiar locality. Similarly "Beth" denoted whatever he had gathered when living at Bethlehem, Pennsylvania. But more amazing still was his treatment of the specimens received from his distinguished contemporaries.

Schweinitz conducted active correspondence with a surprising number of botanists, and another of the manuscript books presented by Mr. Rau in 1931 contains his own list of 93 "Botanical Correspondents," concerning whom Dr. John Hendley Barnhart is preparing for BARTONIA a special account. On the list are well known botanists both of America and Europe, and he received collections so valuable as those that Baldwin had gotten in Georgia, Elliott was gathering in South Carolina, Ledebour had procured in the Altai region of central Asia, Sprengel in Germany, and Wallich in India. The specimens of all collectors were treated alike, their original labels uniformly discarded, and the abbreviations of collector and country written upon the rough paper folder. Often these abbreviations became cryptic signs, so that we are indeed counting upon

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[9] Bartonia 9: 22–23. 1926.

Dr. Barnhart's contribution to help us recover the valuable data so wilfully lost over a century ago.

There is yet other assistance to be had toward the task of regaining information as to the source of some of these collections of Schweinitz' correspondents. This is from a series of letters from 73 persons, many of whom are also on the list of correspondents. These are also being reviewed so that they may add their further and often more definite information.

Thus, the end of a century from the arrival of a great herbarium finds us still at work, seeking to understand it better and to make its treasures more available. The labor of mounting its specimens has now been completed for half of that century, and the specimens themselves are widely scattered among the hundreds of thousands of sheets that have been added to the Academy's Herbarium since their incorporation. But, in whatever cover of the Herbarium they are the characteristic handwriting of Schweinitz distinguishes them, and too long many of them have stood for enigmas rather than sources of information. The time seems not distant when nearly all of them will yield whatever story they have for us.

But the end of the century finds Schweinitz' herbarium of Fungi kept together, as illustrating his greatest contribution to science. While work can doubtless be done also in gathering the meaning of his handwriting in it, this series of specimens will certainly remain for centuries to come one of the outstanding possessions of the Academy of Natural Sciences of Philadelphia.

Schweinitz' Collecting-Ground in North Carolina

P. O. SCHALLERT

Rev. Lewis David von Schweinitz did his botanical collecting in the Salem community in North Carolina between 1812 and 1821. As he was a minister here of the Moravian Church and also connected with the Moravian Academy for Women, he had opportunities for extending his collecting field into several counties and also into surrounding states. Even in those remote days Salem Academy had boarding pupils from a considerable territory, and no doubt they brought many plants to him.

In the years since coming to Winston-Salem in 1910, I have become acquainted with the local flora and have been gathering again the species that Schweinitz found here. Indeed, if I had all the names of those that he collected, I could now, over a hundred years later, almost reconstruct the different routes he must have taken to obtain them. In pondering the many place-names mentioned in his manuscript "Flora Salemitana," I find my thoughts visiting these very spots, which are even yet so full of interesting specimens for the botanical enthusiast.

Salem has had many interesting events written on the pages of its history that have spread its reputation throughout the world, but perhaps no other event in its entire history has awakened such continued world-wide interest as has the research and botanical explorations of Dr. von Schweinitz. The several thousand plant specimens that he first found, described, and named, included many so-called "type" specimens; and for accurate identification it is always necessary to compare subsequent finds and discoveries with such original material. Schweinitz' specimens are now preserved in the herbarium of the Academy of Natural Sciences in Philadelphia. While most of his discoveries were of Fungi, his study also included numerous new species of vascular plants. In order to collect again the species first gathered by Schweinitz, thus verifying the type locality and often getting some information no longer apparent from the "type" specimen, this local area has been many times visited by botanists with international reputation. Thus in times past such well-known botanists as Drs. Wood, Gray, Chapman, Lesquereux, Greene, Bessey, and others visited here, and during my sojourn Dr. Hugo Glück of Heidelberg University in Germany; Drs. B. O. Dodge, Neil Stevens, C. L. Shear, W. W. Ashe and E. T. Wherry of the United States Department of Agriculture; and Drs. A. J. Grout, John K. Small, C. C. Plitt, F. W. Pennell, O. E. Jennings, J. E. Benedict, Jr., H. M. Curran, H. L. Blomquist and H. M. Hall have all rejoiced at the opportunity of wandering over these fields hallowed by the work and discoveries of the pioneer botanist.

While living at Salem, Schweinitz was assisted by another botanist, Rev. Christian Frederick Denke, a fellow Moravian minister, who remained in this community after Schweinitz had moved to Pennsylvania. That Denke must also have been an enthusiastic collector is proven by his large collections, some of which are still to be found, well preserved, in the herbarium of Salem College.

The importance of relocating the old collecting-grounds of the early scientists is well illustrated by the case of the orange rust fungus which infects the wild blackberry and raspberry, a *Puccinia* first described by Schweinitz. Several years ago Dr. Dodge discovered that there were really two similar rusts that infest these same host plants. Then he made a trip to Philadelphia to compare his new discoveries with the Schweinitz' specimens, both of the blackberry and raspberry, but this did not solve the problem since these old type specimens were too fragmentary and the old spores would not sprout. The old label stated that the specimens were found near Bethania in the Salem Community. So Dr. Dodge visited the writer and together we tried to follow the old horse-trail, partly on foot but mostly by auto. We gathered many specimens of the orange rust-fungus growing on as many different blackberry species as could be found along the way from "Peter Creek" to "Bethabara," "Jerusalem meadows," and "Bethania." One of the Schweinitz specimens, growing on raspberry, bore a label which stated that it came from a point between "Fockels farm" and "Sisters Meadow" and here too we were successful in finding a few remaining raspberry plants, also still infested with this same orange fungus. When Dr. Dodge later examined all these different specimens of the orange rust fungus, he found them all to be of the same species, and therefore concluded that in all probability he had found the same species that Schweinitz collected and described over a hundred years ago. This incident shows also the secondary importance of ''type'' locality when the ''type'' specimen is lost or otherwise unavailable for accurate identification.

Another incident taken from the writer's experience in this section happened nearly twenty years ago. It was my first trip to the DeSchweinitz' ''Cascades,'' and never before did I get such a thrill from nature's wonderland as on viewing these falls with all the rocks around, about, and above, covered with mosses, liverworts, lichens, ferns, and other plants. Of course, as a botanist, I collected some of each, as there were over a hundred species I had never collected before. And now comes the strange find of the day! While wading, barefooted, in the rapidly flowing stream, my feet came into contact with a stiff, curly, horsehair-like growth on the submerged stones. I peeled some of it loose and discovered that it was black, about half an inch or less high, made up of many strands of somewhat brittle, fine, hair-like growth. I felt sure that it was a lichen and thought it might be either an *Alectoria* or *Ephebe,* but the strange habitat was confusing and contradictory—a lichen growing on submerged rocks in a rapidly flowing stream! I sent specimens to two American authorities on lichens who said that it was an *Ephebe* but that the specific name was in doubt as they had never seen it before. At their suggestion I sent a specimen to a French lichenologist who had made a minute study of the genus. He replied asking for many more specimens and informed me that this was *Ephebe Lesquereuxii* named in honor of the distinguished botanist and geologist, Lesquereux. The scanty specimen at the French Academy of Science bore on the label information that it had been gathered ''somewhere in eastern North America.'' It would seem that Schweinitz had probably found the plant at the ''Cascades'' and that from him it had finally reached Lesquereux.

The writer has been requested by the Philadelphia Botanical Club to prepare this paper attempting to relocate the places mentioned by Schweinitz in his unpublished ''Flora Salemitana'' of 1821. It has indeed been a labor of love and I am grateful to the many who have contributed of their recollections of places or of anecdotes connected with the great botanist—Rev. Douglas Rights, Miss Anna Rights, Miss Regina Vogler, Mrs. Sallie Stevenson, Henry E. Fries, Miss Adelaide Fries, H. A. Pfohl, B. J. Pfohl, S. E. Hall and William Hall.

Within Winston-Salem: The following places were no doubt located within the present city limits of Winston-Salem but all are now lost to science as plant collecting grounds, for many have been filled in, built over or even excavated and carried away. This is true of ''Fockel's or Fogle's Farm'' which was below the present Belews St., extending from just east of Taylor Brothers' Tobacco Factory, south to the old Fogle Furniture Factory, an area now mostly covered with railroad tracks, except the ''meadow'' which is covered instead with colored tenement houses; ''Peter's Creek'' and ''Swamp'' are now Hanes Athletic Field of our High School; ''Potter's Meadow,'' where potters clay was secured from which pottery, roof and floor tiles, and pipes were made, is back of the colored Moravian Church and has become the athletic field of Salem College; ''Salem Mill'' ''Dam,'' ''mill run,'' ''mill run swamp,'' and ''mill run meadow,'' are even now still visible, extending from beyond the south-bound railroad trestle and below Columbia Heights towards the children's playground of Central Park Graded School; ''Dr. Shuman's'' first place was on the way about half way up to the top of the present-day Happy Hill, and his second place was at the present Dr. Bahnson's place; ''Sisters' field,'' ''meadow'' and ''valley,'' are all back of the old Sisters' House now a part of Salem College campus and used as tennis courts and athletic fields; ''Sycamore Ford'' through the ''Wach''—now Salem Creek—was on the way from Potter's meadow to Dr. Shuman's place on Happy Hill; Banks of the ''Wach'' now the banks of Salem Creek; ''Beach Ford'' was across the Salem Creek at a sandy beach where the present Waughtown Street bridge is located; ''Brethren's Spring,'' where for-get-me-nots are still found growing, is still visible and is located just across Salem Creek, near the road leading from Centerville-Waughtown Highway towards Happy Hill; ''Hege's Meadow'' was back of Central Park School and is now the children's playground; ''Salem Springs'' can still be located in the lower end of Salem Graveyard, just east of Cedar Avenue; Salem Mill was located near where South Broad Street now crosses Salem Creek; ''Lich Creek,'' ''meadow'' and ''field'' were located just beyond the old Fogle Furniture Factory and where the city incinerator plant is located and below (there are also Lich Creeks in South Fork and in Old Town Townships); ''Stony Point'' was a rocky outcrop in the present Salem Cemetery near the present Fries' vault and was the place where the Indian Pipe, Corpse Plant, or Ghost plant, *Monotropa uniflora,* and the *Schweinitzia odorata* or Sweet Pinesap, were found; ''Wheeler's'' place was located over in East Salem and extended down to the branch just east of Union Passenger Station and Wheeler Street; ''Shaffner's meadow'' was south of the Fockel meadow along ''Lich creek''; Bishop ''Herrman's'' place was the old Bishop Rondthaler home; and old ''Dr. Shuman,'' a practising physician who had freed his slaves by sending them back to Liberia in his declining years, lived at the Dr. Bahnson place adjoining; ''Rev. von Schweinitz'' lived in the house just north of the Bahnson place, where Rev. E. H. Stockton now lives, and the meadow back of his house was his ''quarter meadow''; ''David Spach's rock'' was located just south of the old Leinbach Peach Orchard in West Salem and extended south to lower end of Franklin Street along the present Spaugh Street; ''Ackerman's rock'' was southwest of David Spach's farm beyond West Salem, across ''Peters Creek''; ''Boners,'' were made up of several families, of which Joshua was the church organist and conducted a store near the present home of Mrs. Ella Welfare on South Main Street; Thomas, a hatter and father of John Henry Boner, the poet, once ran the old Washington Hotel and lived in the house where the poet was born on South Liberty Street, then called Salt Street, extending only from Academy Street to Shallowford Street; and Van or Evan, who lived at the corner of South Liberty and Bank Street in the home now owned by Fred Hire; ''Tavern Meadow'' was back of the old Washington House and extended westward to Tar branch as there was no Liberty Street then. The old ''paper mill'' with its ''dam'' was on ''Peter's Creek'' below Christ Moravian Church; ''the tannery,'' ''race,'' ''meadow'' and ''pond'' were all located just above and below where Academy Street crosses Tar Branch near South Marshall Street intersection; ''Vogler's pond'' and ''dam'' were located between the old Mineral Springs on South Marshall Street and south of the present Washington Avenue, extending along this little valley and down along Tar Branch to about the present Walnut Street, where the old Chimney House is still standing; ''Nathaniel Blum'' lived on the Southwest corner of Walnut and Broad Streets and was the miller at the Salem mill, just below on Mill Street; ''Jacob Blum's'' farm was located on the Brushy Fork Creek near the old ''Mickey Dam,'' ''mill'' and ''pond,'' now a part of the North Winston-Water works; ''Wm. Holland's'' place with ''Ab. Hauser's'' farm adjoining was also in this same neighborhood—he was also a botanist and florist and built, out of logs, the first greenhouse ever known in this section, and was the grandfather of Dr. W. J. Holland, the recent authority on moths and butterflies and director of the Carnegie Museum at Pittsburgh, Pennsylvania; ''David Blum's'' farm was located south of the present Salem Waterworks and extended east towards Waughtown and took in the present Nissen Rock and stone quarry; ''Double Branches'' are found, even now, just north of the present Fair Grounds, but the water is no longer fresh and clear; ''Zevely's place'' was just across from the Salem Tavern, on the southeast corner of Blum and South Main Street, and his farm was at the bottom of the hill on Peters Creek and Reynolda Road; ''Snipes'' place was on North Trade Street, just beyond 8th Street; and ''Belo's Mill'' and ''pond'' with the old ''Keysers Ironworks'' were near the present intersection of Northwest Boulevard and N. Cherry Street on Peter's Creek; ''Lion's Crag'' was an outcrop of granite rock in the present Washington Park on Southside.

Beyond the Winston-Salem community in Forsyth County, then a part of Stokes County: ''Col. Clemmons' place,'' ''Burkhardts','' ''Rev. Kramsches,'' and ''Clemonton'' were in the vicinity of present ''Hope'' Moravian Church; ''Beroth's meadow'' was near Olivet Moravian Church; ''Dobs Lane,'' ''Johns Ford'' across the Johannes Creek just beyond Bethabara, ''Bethabara Mill,'' ''dam,'' ''pond,'' ''meadow'' and ''graveyard'' were all around the present Oldtown Moravian Church; ''Bethany'' or ''Bethania'' is the present Bethania Moravian Church community and ''John Schor (Shore) place,'' 4 miles west of Bethania, ''Isaac Schulz'' and ''Peter Schmidt'' were well known farms and farmers in this vicinity; ''Christopher Ellrod's'' farm and ''Peddycourt's'' were located near ''Hope'' Moravian Church on Clemmonsville Highway; ''Buffalo Creek'' is in the north end of Forsyth County, near ''Germantown''; likewise ''Neatman's Creek'' and ''B. Gibson's'' farm are located near Germanton in Stokes County just across Forsyth County's north boundary line; ''Blanket Bottoms'' Creek flows into ''Yadkin River'' west of Clemmons; ''Jerusalem Meadows'' were on the present highway towards Bethania; ''Col. Williams'' farm with the ''Beard's Bridge'' near it was located in Little Yadkin township, then a part of Surry county but now a part of Forsyth County; ''South Fork Creek'' is well known in Forsyth County; ''Spach's meadow'' at the old ''Adam Spach's Rock House'' in the ''Friedberg'' Moravian Church community is also a well-known place; ''Stafford Flatrocks'' are the stone outcroppings near the present Will Stafford farm, just beyond Mt. Carmel Church and now owned by Bennett Brothers; ''Friedland,'' ''Fried Ford,'' ''mill,'' ''dam,'' ''meadows'' and ''swamp'' with the ''Rev. C. D. Buchholtz's'' place are all to be found around ''Friedland'' Moravian Church; ''Martin Haines'' owned a farm on the Yadkin River where the power plant is now located at Idols; and ''Riddles Ferry'' crossed the Yadkin River at this point; ''Reich's meadow'' is below John Reich's place on the Salisbury Road, just beyond the city limits on the southwest; and ''Morava Creek'' is part of the present southern boundary line of Winston-Salem and flows into Peter's Creek just beyond John Reich's.

Places in other surrounding counties: First in ''Yadkin'' County, then all in Surry County; such as ''Bean Shoals,'' two miles north of East Bend on the Yadkin River; ''Lime Rock'' in the northern part; ''Hamptonville,'' a small village; ''Huntsville,'' across the Yadkin River from West Bend; ''Yadkin River Bridge'' beyond Clemmonsville; and ''Shallowford'' community at the Yadkin River. Next we find ''Lexington,'' the ''Narrows'' of the Yadkin River at the Badin Dam, ''Uwharrie Creek,'' ''Uwharrie River,'' ''Uwharrie Mountain,'' ''Lick Creek,'' ''Flat Swamps Creek,'' ''Flat Swamp Mountain'' and ''Longs Ferry'' all in Davidson County and extending into Randolph County all to the south of Forsyth County; the little town of ''Uwharrie'' and ''Little Creek'' and ''Little River'' are in Montgomery county; ''Guilford Courthouse'' near the ''Guilford Battleground,'' ''Jamestown,'' ''Stokesboro'' now Stokesdale, and ''Greensboro'' in Guilford county; ''Cascades,'' with ''Col. Moore's'' near it, ''Danbury,'' ''Isaac Dalton's'' place at Dalton, ''Walnut Cove,'' ''Kings,'' ''Pinnacle,'' ''Col. Hairstones'' on the ''Dan River'' near the Walnut Cove-Mayodan Highway and ''Arch Ruffins'' place, all in Stokes County; ''Pilot Mountain,'' ''Sauratown'' and ''Sauratown Mountains'' and the ''Famous Meadows'' (probably the celebrated ''Meadows of the Dan River'') in present Surry county; ''Hunting Creek,'' flowing in ''Wilkes,'' Davie and Iredell Counties; ''Island Ford'' and ''Statesville'' in ''Iredell'' County; ''Salisbury'' in Rowan county; ''Catawba River'' and ''Ford'' in ''Catawba county''; ''Deep River'' and ''Haw River'' both have their sources to the east of Winston-Salem near Colfax and Kernersville respectively and flow southeasterly and easterly.

Other places mentioned by Dr. von Schweinitz are: ''Philpot'' and ''Patrick counties'' in Virginia; ''Raleigh,'' ''Clinton,'' ''Chapel Hill,'' ''Lincolnton'' and ''Fayetteville'' in North Carolina, all well-known places. There still remain about half dozen places unidentified as ''Cary Spring,'' ''James Clemons in Guilford County,'' ''Selatniel Stones,'' and ''Witches Hope.'' Further intensive study should also reveal these locations.

Lewis David von Schweinitz, the Mycologist

Don M. Benedict

Although intensively interested in all the fields of botany, the chief interest of Lewis David von Schweinitz was among the fungi. This interest asserted itself when he became a student of Albertini at Niesky and resulted in the joint publication by teacher and student, in 1805, of their: ''Conspectus fungorum in Lusatiae superioris agro Niskiensi crescentium.'' It is difficult to determine exactly what portion of the work was done by the junior author, but we know that he executed the beautiful colored plates and wrote the preface, while those who are critical of Latin style recognize his easy flow of words in the descriptive portion of the text. Although the thought as well as the expression of it may be largely that of Schweinitz, sight must not be lost of the fact that Albertini introduced him to the instruments of his science and gave confidence and support to the undertaking. Recalling Schweinitz's generous consideration of Torrey in later years, we cannot help feeling that in the authorship of this first publication, the student is paying a tribute to the teacher.

The results of this first publication are far reaching. First of all, the imposing size and composition of the volume commanded notice and respect. It described and illustrated ninety-three new species. The arrangement was according to the system of Persoon and naturally by supporting it, furthered its establishment. In its preface, Schweinitz stated the working principles of his science: "a perpetual daily and nightly employment of microscopic observations, a diligent and oft repeated examination of the whole history of the fungus tribes, a careful perusal of authors, a comparison of their respective synonyms, and above all, by the observations of living nature herself."[1] Just how closely he adhered to these principles may be judged from his later works. Certainly in later years he used the microscope less and less. This led to a misinterpretation of some of his new species, such as basing *Sphaeria herculea* on the already described basidiomycete, *Rhopalogaster* (*Cauloglossum*) *transversarium.* Probably the poor definition of his instrument even for that day is largely responsible for its discontinuance. For its authors, the Conspectus Fungorum established a reputation and gave them prominence among European mycologists. From this time, Schweinitz's work is independent of his teacher and it is thus equipped that he returns to America in 1812.

Three closely related achievements are responsible for designating Schweinitz as the founder of Mycology in America. These are his two later publications on fungi,[2] and his herbarium which was the basis of his publications. In order to properly evaluate these works, a quotation from that Dean of Mycologists, Dr. J. C. Arthur, will serve.[3] "In the North Carolina list there are forty-five such [*new*] species under the genera *Aecidium, Uredo, Puccinia* and *Gymnosporangium,* and of these only one was wholly misunderstood, nine are still accepted under the full names given by Schweinitz, twenty-one still have the same specific name but are placed under other genera and fourteen only have the name wholly suppressed under synonymy."

Although Arthur and Bisby have fully described the fungous herbarium left to the Academy of Natural Sciences after the death of Dr. Schweinitz, a repetition of some of this information may not be out of place. The specimens are contained in 39 portfolios made of heavy cardboard and covered with green paper. They are approximately 22 by 38 centimeters in size and of varying thickness with a label on the back bearing the portfolio number and generic names contained within. Black tape tied over the open side holds the contents in place. Each portfolio contains from three to five large fascicles folded from gray-blue paper and of the same dimensions as the portfolio. Small packets varying in size and number are contained in the fascicles. The packets are folded so that the long sides of the paper overlap very little or not at all and have the ends folded over the open face. The name of the specimen is written in ink on the back of the packet. The locality is usually abbreviated and dates occur rarely. New species are accompanied with the signature "L. v. S." In 1851, Curtis examined the herbarium sending much duplicate material to his brother-clergyman Berkeley. In 1856 and 1857, Dr. Ezra Michener was engaged to arrange the specimens in a manner to be more easily accessible. This work was done at his home in New Garden, Pa. Representative material was glued to slips of paper of uniform size and these pinned to folded sheets of brown paper, eight to the page, and numbered according to the Synopsis of North American Fungi. These larger sheets are grouped in numbered portfolios and held in place with ties of tape. In some instances the last specimen remaining in the original packets was used and many of the packets were already empty when they were placed in Dr. Michener's hands. The specimen selected by Dr. Michener may not in all cases be representative and wherever specimens are left in the original packets, they should be consulted for critical purposes.

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[1] Translation in Walter R. Johnson's "A memoir of the late Lewis David von Schweinitz." 1835.

[2] Synopsis fungorum Carolinae superioris secundum observationes. 1822.
Synopsis fungorum in America Boreali media degentium secundum observationes. 1832.

[3] Arthur and Bisby: An Annotated Translation, etc. 1918.

Schweinitz's great contribution to American mycology consists in publishing some twelve hundred new species of fungi largely supported by "types" in his herbarium. Although he instigated no new system, I am indebted to Dr. P. O. Schallert of Winston-Salem, N. C., for the information that Ricken[4] states that Schweinitz was the first to point out the systematic value of spore color among the gill fungi, a method that is followed to the present day. As a founder, Schweinitz built well for as long as time preserves a single specimen of his herbarium, it will remain source material of American mycology.

Schweinitz' Botanical Library

Don M. Benedict

Eighteen years ago, in a paper written by Arthur and Bisby,[1] the question was raised as to the extent of the library which von Schweinitz possessed. The authors said: "Probably his botanical library was not large, but what works it contained can only be inferred. There are no records of books having been given to the Academy of Natural Sciences of Philadelphia or to the American Philosophical Society, and no such books are now in possession of his descendants." One of the grandsons, the authors stated, did not recall seeing any of the books in his father's library. Then they made the following speculation: "It is probable that the current works of Pursh, Michaux, Nuttall, Darlington, Bartram, Torrey, Barton, Muhlenberg . . . were at his disposal. . . . Naturally he brought to this country the knowledge and many of the books which had aided in making the 'Conspectus of Fungi about Niesky'. . . . In that work, as well as in the Carolina list, he followed Persoon. . . . In 1825 Link's treatment of the Hyphomycetes and Gymnomycetes for Willdenow's edition of the 'Species Plantarum' became available, and received Schweinitz full indorsement."

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[4] Ricken, A.: Die Blatterpilze. Vol. I, p. XXIV.

[1] An annotated translation of the part of Schweinitz's two papers giving the Rusts of North America. By Arthur, J. C., and G. R. Bisby. Proceedings American Philosophical Society, Vol. LVII, 1918.

There are several reasons why information concerning the books in von Schweinitz's possession and their present location would be of value. As we have seen, the question has been raised as to the nature and extent of his botanical library but quite without answer. Of more moment, his own published works and herbarium can be studied and used to the greatest advantage critically only when the standards and criteria which he himself used are known. Then, too, there would be the interest of a permanent record. Unknown to him, at the very time that Dr. Arthur was spending many hours at the Academy of Natural Sciences studying the rusts in the Schweinitz herbarium in preparation of the paper from which we have quoted above, some half dozen books of Schweinitz's were actually on the shelves of the Academy library. At an earlier date, the desired information seems almost to have been within the reach of Dr. Arthur. When the Schweinitz's library was sold in February, 1886, by Dr. Eugene A. Rau of Bethlehem, Pa., a complete list of the books was sent to Dr. John M. Coulter with whom Dr. Arthur was associated as editors of the *Botanical Gazette.*

After the passing of Dr. Rau in 1932, his books and memoranda came into the possession of the Academy of Natural Sciences. It is largely from these memoranda, often just scraps of information written on odd envelopes, that this information has been gathered bit by bit and later verified.

In a communication early in 1931 to Dr. Francis W. Pennell of the Academy, Dr. Rau stated that the scientific books of Schweinitz's library were turned over to him by the Rev. Robert de Schweinitz, son of the versatile scholar. He was requested to sell the books in order to raise funds to publish a sketch of the life of Lewis David von Schweinitz together with his portrait. This appeared in the Journal of the Elisha Mitchell Scientific Society for the year 1885–86. In his boyhood days, Dr. Rau remembered having seen manuscripts and books in a chest in the attic of the von Schweinitz home which was but a few houses distant from his own. The manuscripts were later given Dr. Rau who in turn bequeathed them to the Academy. From the above, it is evident that after the death of von Schweinitz in 1834, his books and manuscripts were placed in chests and kept intact for fifty-two years (1886). We could wish that the facts concerning them might be stated as concisely and exactly for the next fifty years.

In early February, 1886, Dr. Rau prepared mimeographed sheets listing the ninety-one items given him. Sheets containing only seventy-one of the items with prices were distributed first. They were sent to Dr. E. J. Nolan, librarian of the Academy; Prof. Asa Gray; Mr. J. B. Ellis; Mr. William C. Stevenson, Jr.; Prof. W. A. Kellerman, at that time at Manhattan, Kansas; Dr. Benjamin Everhart; B. Westermann and Co., New York; Dr. Charles Schaeffer; Dr. A. E. Foote; Prof. N. L. Britton; and Dr. John M. Coulter. Letters announcing the sale of the books but not including lists were sent to Mr. J. H. Redfield and Dr. J. W. Eckfeldt. Dr. Gray gave his list to Dr. Wm. Trelease who at that time was connected with the Shaw School of Botany in St. Louis.

A second list containing twenty of the items was later distributed with the announcement that: ''These books have been laid aside and will probably not be offered for sale. However should any of them be desired an offer may possibly be considered.'' There is no record that any of these items were sold, although Dr. Coulter and Dr. Foote submitted bids for three items. Three of them were given by Dr. Rau to Dr. C. L. Shear on June 8th, 1922. Four items remain unaccounted for. The remainder were given to the Academy by Dr. Rau in 1931.

Since most of the lists were sent to people living in the Philadelphia area, one might expect that a majority of the volumes may have come to this vicinity. Such does not seem to have been the case. The accompanying list indicates the present location of the books so far as they are known. It is hoped that as time goes on, the information may be completed. The books which have been examined are in a remarkably fine state of preservation. Many of them are annotated and interlined in Schweinitz's hand-writing. How correct Arthur and Bisby were in their speculation can now be determined. Only Darlington and Bartram are conspicuously absent and this is not easily understood. That his library was not small is certain. It contained all the fundamental works of his day in all the fields of botany excepting phycology. In these fields all the works now considered as the starting point for nomenclature were present. To-day, volumes similar to those in his library are used constantly in referring to source material. One hundred years later, they are as indispensable to us as they must have been to him. Could any other individual in America contemporaneous with Lewis David von Schweinitz boast of a botanical library as complete?

LIST OF BOTANICAL WORKS IN VON SCHWEINITZ'S LIBRARY

1. ACHARIUS, E.: Lichenographia Universalis, 1810. ''A.''
2. '' '' : Methodus quo omnes detectos lichenes, etc. 1803. ''F.''
3. AGARDH, C. A.: Species Algarum. 1820, 1821, 1822, 1828. ''F.''
4. AITON, W. T.: Hortus Kewensis. Vols. 1, 3, 4, 5. 1810–1813. ''B.C.''

5. Barton, Wm. P. C.: Compendium Florae Philadelphicae. 1818. “A.”
6. Bentham, G.: Catalogue des Plantes indigenes des Pyrenees et du Bas-Languedoc. 1826. “A.”
7. Bigelow, J.: Florula Bostoniensis. 2nd Ed. 1824. “F.”
8. Bridel, Sam. E.: Muscologia recentiorum. With supplement. 1797. “B.”
9. Brongniart, A. T.: Essai d'une Classification naturelle des Champignons. 1825. “S.”
10. Brown, R.: Prodromus Florae Novae Hollandiae et Insulae Van-Diemen. 1810. “A.”
11. Carr, Robert: Periodical of fruit and ornamental trees, shrubs and greenhouse plants cultivated and for sale at Bartram's garden. 1828. “A.”
12. De Candolle, A. P.: Essai Elementaire de Geographie Botanique. 1820. “T.”
13. “ “ : Regni Vegetabilis Systema Naturale. 1818, 1821. “A.”
14. Dickson, James: Fasciculi Plantarum Cryptogamicarum Britanniae. 1785. “B.C.”
15. Donn, J.: Hortus Cantabrigiensis. 1811. 6th Ed. “A.”
16. Elliott, S.: A sketch of the Botany of South Carolina and Georgia. 1821–24. “F.”
17. Eschweiler, F. G.: Systema Lichenum. 1824. “B.N.Y.”
18. Fries, Elias: Elenchus Fungorum. 1828.
19. “ “ : Systema Mycologicum. 1821–1822.
20. “ “ : Schedulae criticae de Lichenibus exsiccatis Sueciae. 1824. “F.”
21. “ “ : Systema Orbis Vegetabilis. 1825.
22. Gaertner, P. G., B. Meyer und J. Scherbius: Oekonomisch-technische Flora der Wetterau. Frankfurt. 1802.
23. Gingins, F. C. J.: Memoire sur la Famille des Violacees. 1823. “F.”
24. Hedwig, J.: Species Muscorum Frondosorum. 1801 and supplements 1811–28. “A.”
25. Hoffmann, G. F.: Vegetabilia Cryptogama. 1787–90. “A.”
26. “ “ : Deutschlands Flora. 1795. “B.B.N.Y.”
27. Hoffmannsegg, J. C. Graf von: Verzeichniss der Pflanzenkulturen in den Gräflich Hoffm. ischen Garten zu Dresden. 1824. “B.Y.N.”
28. Hooker, W. J.: British Jungermanniae. London, 1816. Nos. 20, 21, 22.
29. “ “ : Flora Boreali-Americana. Part I, 1824; II, 1833. “J.M.C.”
30. “ “ : A Catalogue of Plants contained in the Royal Botanic Garden of Glasgow. 1825.
31. Hoppe, D. H., and Hornschuch, F.: Caricologia Germanica. Leipsic. 1826. “B.N.Y.”
32. Hudson, Wm.: Flora Anglica. London. 1778. “B.N.Y.”
33. Kunze, G., and Schmidt, J. K.: Mykologische Hefte nebst einem allgemeinem botanischen Anzeiger. Leipsig. Vol. I, II.—1817, 1823. “B.N.Y.”
34. Lindley, J.: An Introduction to the Natural System of Botany. First American edition with appendix, by John Torrey. N. Y. 1831.
35. Linnaeus, C.: Flora Lapponica. 2nd Ed. and emend. London. 1792. “B.C.”
36. “ “ : Flora Suecica. 2nd Ed. Stockholm. 1755.
37. “ “ : Philosophia Botanica. curante K. Sprengel. Ed. IV. 1809.
38. Marshall, H.: Arbustum Americanum or Catalogue of Forest Trees and Shrubs. Natives of the U. S. 1785. “B.C.”
40. Martius, K. F. P. von: Beitrag zur Kentniss der Natürlichen Familie der Amarantaceen.
41. Muhlenberg, Henry: Catalogus Plantarum Americae Septentrionalis. 2nd Ed. Phila. 1819. “B.”
41. “ “ : Descriptio Uberior Graminum et Plantarum Calamariarum Americae Septentrionalis. Phila. 1817. 2 copies. “B.” “F.”
43. Michaux, A.: Flora Boreali-Americana. Paris. 1803. “A.”
44. Nees von Esenbeck, C. G.: Das System der Pilze und Schwamme. Wurtzburg. 1816.
45. “ “ “ “ : Synopsis Specierum Generis Asterum herbacearum. Erlange. 1818.
46. Nuttall, T.: The genera of North American plants. 1818.
47. Persoon. C. H.: Mycologia Europaea. 1822,–25,–28. “A.”

48. " " : Synopsis Methodica Fungorum. 1801. "A."
49. " " : Tentamen Dispositionis Methodicae Fungorum. 1797. "S."
51. " " : Synopsis Plantarum. 1805–1807. "J.M.C."
52. Planer, J. J.: Index plantarum quas in agro Erfurtensi. 1788.
53. Prince, Wm.: A treatise on ornamental trees cultivated at the Linnaean botanical garden, Flushing, L. I. 1820. "B.C."
54. Pursh, C. F.: Flora Americae Septentrionalis. 2nd Ed. 1816. "A."
55. Radius, J.: Dissertatio de Pyrole et Chimophila. 1821.
56. Rafinesque, C. S.: Medical Flora. 1828, 1830. "A."
57. " " : Precis des decouvertes et travaux somiologiques. 1814. "F."
58. " " : Prodromus d'un Monograph. des Rosiees. "F."
59. Rebentisch, J. F.: Prodromus Florae Neo Marchicae. 1804. "B.N.Y."
60. Roehling, J. C.: Deutschlands Flora. Frankfurt a/M. 1812, 1813. "J.M.C."
61. Roth, A. W.: Tentamen Florae Germanicae. 1800.
62. " " : Catalecta Botanica. 1800.
63. Schkuhr, C. Beschreibung der Riedgraeser. 1812. "A."
64. Schrader, H. A.: Spicilegium Florae Germanicae. 1794.
65. Schwaegrichen, C.: Historiae Muscorum Hepaticorum Prodromus 1814. "B.C."
66. Schweinitz, L. v. D.: Specimen Florae Americae Sept. Crypt. 1821. "B.C." "F."
67. " " : Monograph of the genus Viola.
68. " " : Descriptions of new species of *Spheriae*.
69. Smith, J. E.: An introduction to physiological and systematical botany. 1814.
70. " " : Memoir of several Norwich Botanists. 1804.
71. Sprengel, K.: Florae Halensis tentamen novum. 1806.
72. " " : cur. Linnaeus' Systema vegetabilium. 5 vols.
73. " " : Neue Endeck. im ganzen Umfang der Pflanzenkunde. 1820.
74. Sprengel and Schnader: Jahrbuecher der Gewaechs. 1819.
75. Steudel, E.: Nomenclator Botanicus. 1821, 1824.
76. " " : Principia Botanica. 1793. "F."
77. Steudel, E., and Hochstetter, C. F.: Enumerator Plantarum Germaniae. 1826. "B.C."
78. Swartz, O.: Dispositio systematica Muscorum frondosorum Sueciae. 1799. "A."
79. Tode, H. J.: Fungi Mecklenburgenses Selecti. 1790, 1791. "F."
80. Torrey, J.: A catalogue of plants growing spontaneously within thirty miles of New York. 1819. "F."
81. " " : A flora of the northern and middle sections of the United States. 1823, 1824. "A."
82. Wallroth, C. F. W.: Flora Cryptogamica Germaniae. 1831. "B.C."
83. Weber, F.: Historiae Muscorum Hepaticorum Prodromus. 1815. "B.C."
84. Weber, F., und Mohr, D. M. H.: Gross Britaniensis Conferven nach Dillwyn. 1803. "B.C."
85. Willdenow, K.: Grundriss der Krauterkunde. 1798. "A."
86. " " : Species Plantarum. 1797–1824. "B.C."
87. Zeyher: Zur Pflanzenphys. Blumenzucht und Gewächse.
88. Zeyher and Roemer, G.: Verzeichniss der Gewachse im Grossherzoglichen Garten zu Schwetzingen. 1819.
89. Flora or Botanische Zeitung. 1825–1830. "B."
90. Jahrbuch (Link). "B.C."
91. Richardson, John: Botanical appendix to Capt. Franklin's narrative. "F."

Explanations

"A"—Academy of Natural Sciences, Philadelphia.
"B"—sold to Dr. N. L. Britton.

''B.C.''—sold to Dr. N. L. Britton, now probably at Columbia University.
''B.N.Y.''—sold to Dr. Britton, now at New York Botanical Garden.
''B.B.N.Y.''—received by Mrs. Britton, now at New York Botanical Garden.
''S''—given by Dr. Rau to Dr. Shear.
''F''—purchased by Dr. Foote.
''T''—purchased by Dr. Wm. Trelease, now at Missouri Botanical Garden.
''J.M.C.''—purchased by Dr. J. M. Coulter.

The Botanical Correspondents of Schweinitz

JOHN HENDLEY BARNHART

In one of the record books of Schweinitz that came into the possession of the Academy of Natural Sciences of Philadelphia a few years ago is a list of ninety-three names in his handwriting, entitled ''Botanical Correspondents.''[1] On the following pages I have complied, as far as I am able, with the request that I should supply brief biographical notes concerning these persons. Many of them are well-known figures in the history of botany, for Schweinitz was in close touch with the leaders of botanical science of his day. Some, on the other hand, are well-nigh forgotten, and it has given me keen pleasure to try to rescue from oblivion these records of their work, which are essential to a correct understand-

[1] Actual letters from many of these correspondents have survived. Some years ago the Academy received from Dr. George de Schweinitz a gift of 212 letters written to his grandfather, Lewis David von Schweinitz, by 71 individuals during the years from 1817 to 1833. These shed much light upon his interests during those years, and especially on the growth of his herbarium. The largest series came from John Torrey, and these are the ones published some years ago by Shear and Stevens as mentioned below under Torrey. Others are well worthy of such preservation, although it would doubtless be difficult to obtain the reciprocal correspondence written by Schweinitz himself.

On the following biographical sketches those persons from whom there are letters preserved are marked by asterisks. Among these the correspondence notes specimens promised or sent by Bentham, Brace, Cooper, Darlington, Dewey, Duby, Elliott, Fleischer, Freedley, Greville, Halsey, Hooker, LeConte, Ledebour, Lederer, Mitchell, Say, Steinhauer, Steudel, Torrey, Wallich, and Welden; presumably such contributions to Schweinitz' herbarium are discussed also in the letters in German script from Denke, Hoffmannsegg, Ledebour, Martius, Persoon, Schwägrichen, Steudel, Treviranus, Volz, Welden, and Zeyher. These collections were acquired by Schweinitz in return for exchanges of his own specimens. Schweinitz' herbarium grew rapidly by this method, his great accessions being made after his move to Bethlehem in 1821, the whole accumulation seeming to have been the result of only about twelve years' activity. Only once have I discovered that material was obtained by purchase. We have both Steinhauer's and Rafinesque's accounts of the sale by auction of the Zaccheus Collins' herbarium on June 23, 1833, the former jubilant over having purchased from it for Schweinitz the special Baldwin Herbarium, though at his utmost figure of $105.00, the latter asking to buy duplicates from it for his own herbarium.

Schweinitz' vast herbarium seems to have been assembled over a period of about twelve years from his return to Bethlehem in 1821. That there were yet more contributors than those on Schweinitz' list of ''botanical correspondents'' is shown by extant letters from L. C. Beck and A. Gray, of which the earliest was in 1829 and doubtless subsequent to the list; by the mention in Freedley's letters of sending specimens collected in the Tyrol by Fleischer; and by the mention in the ''Handbook to the Museum of the Academy of Natural Sciences of Philadelphia'' in 1837 of there having been in the Schweinitz herbarium specimens from China by Read, from the Polar region by Parry, and from Labrador by Kohlmeister. Concerning the last, LeConte's letters reveal quite a friendly rivalry in Labrador plants. It is clear that the greatest permanent value of any surviving correspondence and of these sketches generously contributed by Dr. Barnhart is the unraveling of the sources of the Schweinitz Herbarium. EDITOR.

ing of the history of botany in the United States during the early decades of the last century.

Ten have successfully eluded my efforts to discover facts concerning them; in a few instances I may not even have deciphered their names correctly. As I read them, however, they are:

Abbott StCroix
Burkard Fr Apoth Nisky
Dalman Gustav Herrnht
Koch Dr Gnadau
Meyer François Barby!! primus
Moosig Steuerrath Görlitz
Schütze Hnr v Halle
Skeel Weimar
Voullaire Marc Henersdf
Wickard Pars Arnsdf

The list is not dated, but was evidently written within a few years of the death of Schweinitz. It included many of his early correspondents, who had been dead for years, but it also included some who were far too young to have been among his early correspondents, such as Bentham, Brongniart, Hering, and Pickering. The list was evidently written all or nearly all at one time, for otherwise he would not have known how many lines to allow for each letter of the alphabet.

One entry reads "Hüffel C G Westind.", and Bishop Hüffel was never in the West Indies until 1827. Another entry is "Leconte Maj Georg," and Leconte's rank as major dated from 18 April 1828. Another entry is "Bentham George London," and Bentham first wrote to Schweinitz suggesting correspondence, 17 May 1828. Finally, one entry reads "Volz Friedrich Philad," and Volz was never in America until 1830. This last entry may have been interpolated, but the list as a whole cannot have been written earlier than 1828.

Albertini, Johannes Baptista von. Born 17 February 1769, at Neuwied, in the Rhine province of Prussia; died at Berthelsdorf, near Herrnhut, Saxony, 6 December 1831. When Schweinitz began the study of theology in the Moravian institution at Niesky, in Upper Lusatia, in 1798, Albertini was one of the professors there; their mutual love of botany drew them together, and they became close friends. In 1805 was published their joint work upon the fungi of the vicinity of Niesky, and this has made the compound authority "Albertini & Schweinitz" familiar to all later mycologists. For the last seventeen years of his life Albertini was a bishop, and for the last seven he was the head of the entire Moravian church.

Anton, Karl Gottlob von. Born 23 July 1751, at Lauban, Upper Lusatia (now Silesia); died at Görlitz, 17 November 1818. He studied philosophy and law at Leipzig, and thereafter practiced his profession at Görlitz. His title (von) dated from 1802. Most of his published writings related to law and history, but he was a member of the local scientific society, in which he also held office.

Baldwin, William. Born 29 March 1779, at Newlin, Chester County, Pennsylvania; died at Franklin, Missouri, 1 September 1819. Educated as a physician, but without a medical degree, he served as surgeon on a ship sailing from Philadelphia to China in 1805, returning in the following year. He then continued his medical studies, and received his M.D. degree from the University of Pennsylvania in 1807. He practiced his profession at Wilmington, Delaware, for a few years, but he was a victim of tuberculosis, and increasingly poor health led him to remove to Georgia in 1811; in both Delaware and Georgia he was an ardent student of plants. He coöperated cordially with Stephen Elliott while the latter was engaged upon his "Sketch of the botany of South Carolina and Georgia." From 1812 to 1816 he served as a surgeon in the United States navy. In 1817 he was appointed botanist to the government mission to South America in the frigate Congress, and upon his return the next year spent some months in Delaware and Pennsylvania, studying the plants he had previously collected. In 1819 he was appointed surgeon and botanist to Long's expedition up the Missouri, but had barely reached the banks of that river when he succumbed to the disease that he had been fighting all his life, dying at the early age of forty.[2]

Barton, Benjamin Smith.[3] Born 10 February 1766, at Lancaster, Pennsylvania; died at Philadelphia, 19 December 1815. He studied medicine at Edinburgh and Göttingen, and when only twenty-five years old became a professor at the University of Pennsylvania. At the time of his death, in his fiftieth year, he was recognized as one of the leaders of the medical profession in the United States, and his reputation as a botanist, and especially as a botanical teacher, was very great. His nephew, **William Paul Crillon Barton**, who was born 17 November 1786, at Philadelphia, and died there 27 March 1856, was also a well-known physician and botanist, and it is not altogether certain which was the "Barton, Dr. Philad." of Schweinitz's list of correspondents.

***Bentham, George.** Born 22 September 1800, at Stoke, near Plymouth, England; died at London, 10 September 1884. He was a precocious child, able at the age of seven to converse fluently in five languages, including Russian. His home was in Russia for several years during childhood, and in France in his youth. It was in France that he became interested in botany, and his first published botanical work, a pamphlet on the flora of the Pyrenees, was written in French. Upon his return to his native land he speedily became acquainted with the leaders of British botany, and devoted the rest of his long life to painstaking study of plants. For twelve years he was president of the Linnean Society of London, and his work is well known to all present-day taxonomic botanists.

Bigelow, Jacob. Born 27 February 1787, at Sudbury, Massachusetts; died at Boston, 10 January 1879. After graduating at Harvard in 1806 and receiving his professional degree from the same institution in 1810, he practiced medicine in Boston for about sixty years, becoming the most eminent physician of that city. His interest in plants began early. Soon after graduation in 1806 he delivered a course of popular lectures on botany in Boston, and in 1812 published his "Florula bostoniensis," of which a second edition appeared in 1824 and a third in 1840. His "American medical botany," with 60 colored plates, was issued in six parts from 1817 to 1821. He was professor of materia medica in the Harvard medical school from 1815 to 1855, but gradually his activity in other fields replaced that in botany. He was a member of the American Academy of Arts and Sciences for sixty-seven years, and its president from 1847 to 1863. At his death he was nearing his ninety-second birthday.

Blumenbach, Johann Friedrich. Born 11 May 1752, at Gotha; died at Göttingen, 22 January 1840. He studied medicine at Jena and Göttingen, and was a professor in the university of the latter city for more than sixty years. He became famous as a physiologist and anatomist, and was the first to urge the value of comparative anatomy in the study of the history of man. He was also interested in forestry and botany, and his friend Schrader dedicated to him a showy South American genus of flowering plants, *Blumenbachia*.

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[2] His herbarium was acquired by Collins, and then purchased by Schweinitz in 1833. EDITOR.

[3] See also "The Elder Barton—his Plant Collection and the Mystery of his Floras" in BARTONIA 9: 17–34. 1926.

***Brace, John Pierce.** Born 10 February 1793, at Litchfield, Connecticut; died there, 18 October 1872. He graduated at Williams College in 1812, and lived at his native place until 1833, when he became the principal of a girl's school at Hartford, Connecticut. For a few years, from 1846, he lived at New Milford, Connecticut, and then, from 1850 to 1861, he was editor of a well-known newspaper, the *Hartford Courant*. In 1863 he inherited the homestead in Litchfield, and there he spent his remaining years. He began to collect plants as early as 1818, and in 1822 published a list of those of Litchfield; his considerable herbarium is still preserved at Williams College. He was an uncle of Mrs. Asa Gray, who often visited him at Hartford.

Brereton, John Andrew. Born 15 April 1787, at Baltimore, Maryland; died at Charlestown, Massachusetts, 21 April 1839. He was a surgeon in the United States navy from 1808 to 1815, and in the army from 1821 until his death. During most of his life his home was at Washington, D. C., where he was one of the group of young enthusiasts who organized the Washington Botanical Society in 1817, and remained a member until the society was disbanded in 1826. He was then a member of the new Botanical Club of Washington, whose work culminated in the publication of his ''Florae Columbiae prodromus'' in 1830.

Breutel, Johann Christian. Born 21 January 1788, at Weissenberg, Saxony, near Bautzen; died at Herrnhut, Saxony, 18 February 1875. Educated as a glover, he soon entered the Moravian ministry, and was located at Gnadenfrei, Silesia, from 1814 to 1819, at Neuwied, in the Rhine province of Prussia, from 1819 to 1824, and at Niesky, Silesia, from 1824 to 1832. In 1832 he became a member of the governing body of the Moravian church at Berthelsdorf, near Herrnhut, and was a bishop from 1853. He made two official visits of inspection to Moravian missions, in 1840 and 1841 in the West Indies, and in 1853 and 1854 in South Africa. On both of these trips he collected numerous plants, chiefly cryptogams, in which he was especially interested. He retired from active service in 1857, when he was nearly seventy years old, but he lived eighteen years longer. His plant collections are now widely scattered.

***Brongniart, Adolphe Théodore.** Born 14 January 1801, at Paris, France; died there, 18 February 1876. He was the son of a famous naturalist, Alexandre Brongniart (1770–1847), and began his studies in the natural sciences at an early age; before he was twenty-one he had limited himself to botany, and more particularly the study of fossil plants. His work, however, extended into all branches of botanical science, and for fifty years he was one of the most illustrious leaders of scientific thought in France. He was elected to the French Academy of Sciences in 1834, and became a professor in the Paris museum of natural history in the same year. He was made an officer of the Legion of Honor in 1846, and was elected to membership in various scientific societies abroad. In 1854 he was one of the founders of the Société Botanique de France, and was its first president.

Cist, Jacob. Born 13 March 1782, at Philadelphia, Pennsylvania; died at Wilkesbarre, Pennsylvania, 30 December 1825. He was a printer in his youth, then a clerk in the postoffice department at Washington; in 1808 he settled at

Wilkesbarre, where he became a leading citizen and was both merchant and postmaster for seventeen years. Through the influence of his father, Charles Cist (1738–1805), who was a physician by education although a printer by trade, he became interested in natural science. He was a geologist, an agriculturist, and an entomologist, as well as a botanist. He became interested at one time in coal-mining, and undertook to popularize the use of anthracite as fuel, but was unsuccessful; it was unfamiliar, and people could not be convinced that the black rocks were fit to burn.

***Collins, Zaccheus.**[4] Born 26 August 1764, at Philadelphia, Pennsylvania; died there, 12 June 1831. He was well known as a Quaker philanthropist, was a lifelong resident of Philadelphia, and was deeply interested in botany. By his contemporaries he was regarded as one of the best-informed botanists in the United States. Their opinion was expressed by the younger Barton in the dedication of his "Compendium florae philadelphicae" to "Zaccheus Collins, Esq., a patient and successful cultivator of that science, the interests of which this little work is designed to promote," and in Nuttall's dedication of the genus *Collinsia* to him as "a gentleman, whose talents as a botanist are deservedly acknowledged." Less formal was the tribute in Baldwin's letter to Darlington, 29 August 1817: "I spent about an hour with Z. Collins, as I came through Philadelphia. I was delighted with him. We immediately recognized each other as old acquaintances (we had never seen each other before)—and entered rapidly upon the subject of botany, in less than a minute." His botanical correspondence is preserved at the Academy of Natural Sciences in Philadelphia.

***Conrad, Solomon White.** Born 31 July 1779, at Germantown, Philadelphia; died there, 2 October 1831. He was a Philadelphia bookseller and publisher, and a minister of the Society of Friends. He was interested in both botany and conchology for many years, and from 1829 until his death two years later was professor of botany in the University of Pennsylvania. Asa Gray, when publishing the genus *Conradina,* in 1870, dedicated it to "the memory of Solomon W. Conrad, the associate of Muhlenberg and other Pennsylvania botanists of the last generation—himself a botanist of no mean acquirements."

***Cooper, William.** Born in or about 1798; died at Guttenberg, New Jersey, 20 April 1864. He spent the years 1821 to 1824 in Europe, studying zoology, and it was primarily as a zoologist that he became widely known in later years. He was, however, always deeply interested in botany; from his early youth he was a close friend of Torrey, who dedicated to him his "Compendium" in 1826, and acknowledged his coöperation in the preparation of his flora of the State of New York. His travels extended as far north as Nova Scotia, as far west as Kentucky, and as far south as the Bahamas; wherever he went he collected plants.

Corrêa da Serra, José Francisco. Born 6 June 1750, at Serpa, Portugal; died at Caldas da Reinha, Portugal, 11 September 1823. Educated for the priesthood at Rome, he became a political power in his native country, but was driven into exile by the intrigues of his enemies, and spent some years in England and France. He was a man of profound and broad learning, especially interested in zoology and botany, and formed close friendships with such men as Banks and Robert Brown in London and Humboldt, Cuvier, and DeCandolle in Paris. From 1812 until 1820 he lived in the United States, being the diplomatic representative of Portugal from 1816. About 1814, when Barton was incapacitated by ill health, Corrêa da Serra substituted for him as lecturer in botany in the University of Pennsylvania. In 1825 was published a pamphlet by him in which all the genera of North American plants were arranged according to the natural system of Jussieu.

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[4] See also BARTONIA 9: 36. 1926. After its public sale in 1833, Collins' herbarium seems to have been acquired by Rafinesque as mentioned in his "New Flora and Botany of North America" 2: 12. 1837. EDITOR.

Cürie, Peter Friedrich. Born 28 June 1777, at Montmereil, Switzerland; died at Berthelsdorf, near Herrnhut, Saxony, 19 February 1855. He was a Moravian minister, and was a bishop from 1825. Schweinitz regarded him as one of his best friends in Germany. In 1823 he published a small pocket key, perhaps the first of its kind, to the wild plants of middle and northern Germany; this proved so useful that successive editions continued to appear until many years after his death.

***Darlington, William.**[5] Born 28 April 1782, at Dilworth, now Dilworthtown, Chester County, Pennsylvania; died at West Chester, Pennsylvania, 23 April 1863. He was a medical graduate of the University of Pennsylvania, in 1804, and in 1806 and 1807 was surgeon of a merchant vessel on a voyage to Calcutta. Upon his return he established himself as a physician in West Chester, where he continued to practice, as his manifold interests in other directions permitted, for more than fifty years. He was a member of Congress from 1815 to 1817 and from 1819 to 1823, and held many other political offices. He was president of the Bank of Chester County from 1830 until his death, and was a member of more than forty scientific and literary societies. His interest in botany dated from his attendance upon the lectures by Barton while he was still a medical student, and widened and deepened in later years. He was the author of various botanical books and papers, and edited and published the letters of Bartram, of Marshall, and of Baldwin, thus preserving for future generations important data relating to the early history of American botany.

Denke, Christian Frederick. For sketch of life see BARTONIA 9: 37. 1926.

Detwiller, Henry. Born 18 December 1795, at Langenbruck, in the canton of Basel, Switzerland; died at Easton, Pennsylvania, 21 April 1887. Leaving Switzerland in 1817, he settled in Pennsylvania, first for a year at Allentown, then at Hellertown, where he practiced medicine for thirty-four years, from 1818 to 1852. He had studied medicine at Freiburg, in Baden, before coming to America, but could not get his degree because of his youth; in 1836 he returned to Freiburg for the degree so long due to him. He was a convert to homeopathy as early as 1828, and was an original member of the American Institute of Homeopathy and of the Pennsylvania State Homeopathic Society. For the last thirty-five years of his long life he lived at Easton. His collections of both plants and animals were extensive, but are now widely scattered in both Europe and America.[6]

***Dewey, Chester.** Born 25 October 1784, at Sheffield, Massachusetts; died at Rochester, New York, 15 December 1867. He graduated at Williams College in 1806, and entered the ministry, but was a pastor for only a few months when he was called back to his alma mater as a member of the faculty; the rest of his long life was devoted primarily to teaching, although he continued to preach frequently for more than fifty years. He remained at Williams until 1827, was principal of a school at Pittsfield, Massachusetts, from 1827 to 1836, and in this year removed to Rochester, New York, which was his home for the remainder of his life. At Rochester he was principal of the high school and professor in the university. He was widely known as a geologist and chemist, but devoted much of his time to the study and teaching of botany, and was long the leading authority in the United States upon the genus *Carex.* His collection of the plants of this genus went to Williams College after his death.

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[5] See also "Dr. William Darlington, Physician and Botanist" in BARTONIA 14: 1–13. 1932.

[6] Detwiller's herbarium is mainly at the Academy of Natural Sciences of Philadelphia. EDITOR.

***Duby, Jean Étienne.** Born 15 February 1798, at Geneva, Switzerland; died there, 24 November 1885. He became interested in botany at an early age, and even after he had become an evangelical minister he continued to assist De Candolle in his herbarium and garden. He was for thirty-two years pastor of the parish of Eaux-Vives, and throughout this period, until his retirement in 1863, and even during the ill-health of his later years, he kept up his interest in botanical science.

***Elliott, Stephen.** Born 11 November 1771, at Beaufort, South Carolina; died at Charleston, South Carolina, 28 March 1830. He graduated at Yale in 1791, and was long one of the most eminent citizens of his state. He was a member of the state legislature from 1793 to 1800, and of the state senate from 1808 to 1812; from that time until his death he was president of the state bank. He is known to botanists chiefly by his remarkable work on the flora of South Carolina and Georgia. This, modestly entitled by its author a ''sketch'' of the flora of those states, was issued in parts from 1816 to 1824; it comprises two thick volumes, and is a storehouse of original observations. Elliott's herbarium is now preserved at the Charleston Museum.

Empie, Adam. Born 5 September 1785, at Schenectady, New York; died at Wilmington, North Carolina, 6 March 1860. He was graduated from Union College in 1807, and ordained to the ministry of the Protestant Episcopal Church in 1809. He was assistant rector at Hempstead, New York, from 1809 to 1811, and rector at Wilmington, North Carolina, from 1811 to 1827, except the two years 1814 to 1816, when he was a professor at the United States Military Academy at West Point, New York. From 1827 to 1836 he was president of William and Mary College, which gave him the degree of D.D., and from 1836 to 1853 he was rector of St. James Church at Richmond, Virginia. In 1853 he retired, and spent the remainder of his life at Wilmington.

***Freedley, Samuel.** Born 2 February 1799, at Conshohocken, Pennsylvania; died at Philadelphia, Pennsylvania, in December 1885. He graduated in medicine at the University of Pennsylvania in 1821, and about fifteen years later became a practitioner of homeopathy; long before this time he had been interested in the study of plants. Upon the establishment of the Homeopathic Medical College of Philadelphia, in 1848, he became the professor of botany, and a year later also of medical jurisprudence; when he resigned, in 1852, the professorship in botany was abolished. From 1854 to 1859 he was professor of botany in the Penn Medical University, thereafter devoting his attention to his private practice and his botanical studies. His herbarium, said to have contained ten thousand specimens, was destroyed by fire about 1880 at his country residence on his farm at Conshohocken, but specimens collected by him are to be found scattered in other herbaria.

***Fries, Elias Magnus.** Born 15 August 1794, at Femsjö, in Smoland, Sweden; died at Upsala, Sweden, 8 February 1878. He studied at Lund, and was on the faculty of the university at that place for twenty years, from 1814 to 1834; for the next twenty-five years, from 1834 to 1859, he was a professor in the university at Upsala. He was a prolific writer upon various botanical topics, and his was the most outstanding figure in the early history of mycological taxonomy.

Gambold (*née* Kleist), Anna Rosina. Born 1 May 1762; died at Springplace, Georgia, 19 February 1821. From 1788 to 1805 she was principal tutoress in the boarding school at Bethlehem, Pennsylvania, where she was enthusiastic in transmitting to her pupils a love of the out-of-doors. In the words of one who knew her at that time, "sprightly in person as well as in fancy and imagination, she was the genial spirit of the institution." In 1805, at Bethlehem, she became the second wife of John Gambold (1760–1827), and in the same year accompanied him to his new post at Springplace, Georgia, as superintendent of the Moravian mission to the Cherokees. The mission consisted chiefly of a school for Indian children, and Mrs. Gambold taught in the school, managed her home, and cultivated her garden, still finding time to study the flora of the wilderness about her. In 1813, in his "Catalogus plantarum Americae septentrionalis," and again in the second edition five years later, Muhlenberg acknowledged the coöperation of Mrs. Gambold. The Portuguese botanist, the abbé José Francisco Corrêa da Serra, who spent the years 1812–20 in America, once visited Springplace, and wrote to a friend in England: "Judge of my surprise, in the midst of the wilderness, to find a botanic garden, not indeed like that at Paris, or yours at Kew, but a botanic garden, containing many exotic and medicinal plants, the professor, Mrs. Gambold, describing them by their Linnean names." And Henry Steinhauer, writing about 1817, said: "On my expressing a wish to see some of the botanical products of that country, Sister Gambold sent me, last autumn, between twelve and fourteen hundred specimens of dried plants, besides near a hundred packets of seeds, several minerals, specimens of all the Indian manufactures of cane, etc., and a number of other curiosities, apologizing for not having done more as the season was unfavorable; whereas I should have thought the collecting of these a good half year's work for one person's undivided attention, under the most favorable circumstances."

Gersdorf, Adolph Traugott. Born 20 March 1744, at Rengersdorf, Silesia; died at Meffersdorf, Silesia, 16 June 1807. He was a Master of Philosophy of the University of Wittenberg, in 1777, and long lived at Meffersdorf, where he devoted much attention to meteorology, and particularly to studies on lightning. His interest in botany must have been rather slight.

Gingins, Frédéric Charles Jean. Born 14 August 1790, at Château La Sarraz, Éclépens, in the canton of Vaud, Switzerland; died at Lausanne, in the same canton, 27 February 1863. He studied botany at Geneva, and for a time gave much promise of becoming a famous botanist; he published a monograph of the Violaceae, and was largely responsible for the treatment of that family in De Candolle's "Prodromus." He also published several other botanical papers, and De Candolle dedicated to him a genus *Ginginsia.* But before he was forty years old he seems to have drifted away from botany entirely, and the remainder of his life was devoted to study of the local history of several of the Swiss cantons.

***Greville, Robert Kaye.** Born 13 December 1794, at Bishop Auckland, Durham, England; died at Murrayfield, Edinburgh, Scotland, 4 June 1866. He studied medicine at London, but did not practice. He became interested in botany at an early age, and devoted much of his life to work in that science. He published a flora of Edinburgh, but most of his papers and books related to cryptogamic plants. In 1824, when he was only thirty years old, the University of Glasgow conferred upon him the honorary degree of Doctor of Laws. All of his illustrated works, of which there were several, were embellished by his own drawings, and he attained considerable fame as a landscape painter.

***Halsey, Abraham.** Born 24 April 1790, in New York City; died in Brooklyn, New York, 4 February 1857. All his work for which he received a salary was clerical, part of the time as accountant for a mercantile establishment, later as a bank cashier. Yet his leisure time was for years devoted to serious botanical study, and that more particularly upon a group of plants then almost unknown to American botanists. He joined the Lyceum of Natural History of New York in 1818, the year after its organization, and the first paper in the first volume of the Annals of the Lyceum, published in 1823, was an account by him of the lichens of the vicinity of New York. In 1839 the degree of A.M. was conferred on him by Columbia University in recognition of his scholarly attainments.

Hering, Constantine. Born 1 January 1800, at Oschatz, Saxony; died at Philadelphia, Pennsylvania, 23 July 1880. He studied medicine at Dresden, at Leipzig, and at Würzburg, where he received his professional degree in 1826; a few months later he was sent by the king of Saxony to Surinam, to collect zoological and botanical specimens, and there he remained for six years, for a part of the time practicing medicine at Paramaribo. On his way back to Saxony, in 1833, he stopped off in the United States, and settled at Philadelphia, and there he remained until his death nearly fifty years later. He was the most famous of American practitioners of homeopathy, sharing according to some with Hahnemann the distinction of being the founder of that school of medicine. Most of his Surinam plants found their way into the herbarium of Schweinitz; it is believed, however, that many of them were actually collected by his friend Christoph Weigelt.

***Hoffmannsegg, Johann Centurius.** Born 23 August 1766, at Dresden, Saxony; died there, 13 December 1849. He studied at Leipzig and Göttingen. Having abundant wealth and social position, he was able to follow his inclinations more freely than most men. He traveled in a leisurely way through Austria into Italy in 1793 and 1794, and in Portugal in 1799 and 1800, studying and collecting plants as he went. Getting in touch with Link in 1802 he developed with him the plan of the great Portuguese flora that was issued under their joint authorship, as a sumptuous folio, in twenty-two parts, from 1809 to 1829. In his later years he continued to take a keen interest in natural science.

***Hooker, William Jackson.** Born 6 July 1785, at Norwich, England; died at Kew, Surrey, England, 12 August 1865. He first began the study of zoology, and later of botany, as a recreation, but eventually devoted nearly all his time to botany. He made botanical expeditions to Iceland in 1809 and to the Continent in 1814. Upon his marriage in 1815 he settled at Halesworth, Suffolk, and devoted his time and his large private income to the building up of a great herbarium. In 1820 he became professor of botany at the University of Glasgow; in 1836 he was knighted; in 1841 he was appointed director of the Royal Botanic Gardens at Kew, where he spent the rest of his life. He was a scholarly yet prolific writer, author of at least fifty botanical volumes and many papers, and editor of several botanical magazines; indeed, he was one of the most famous botanists of his day.

***Horsfield, Thomas.** For sketch of life see BARTONIA 9: 38. 1926.

Hüffel, Christian Gottlieb. Born 13 September 1762, at Kleinwelka, near Bautzen, Saxony; died at Herrnhut, Saxony, 7 June 1842. He was educated at Herrnhut and Niesky; studied theology at Barby; taught at Niesky, 1784–89, and at Barby, 1789–91. While teaching at Barby he became interested in the natural sciences, and was in charge of the school cabinet devoted to them. For the next twenty-three years he was actively engaged in the work of the Moravian ministry; in Ireland, 1791–97; at Berthelsdorf, 1798–1802; at Niesky, 1802–05; at Barby, 1805–09; and again at Berthelsdorf, 1809–1814. He became a bishop of the Moravian church in 1814. From 1818 to 1827 he was president of the Provincial Board in America; in 1827, before his return to Germany, he made a tour of inspection of the Moravian missions in the West Indies. He resided at Berthelsdorf from 1827 to 1836, when he retired to Herrnhut to spend his declining years. Musician and philologist, he nevertheless took great interest in the natural sciences, and especially botany; while in America he spent much time in the field study of plants, in company with Schweinitz.

***Keating, William Hypolitus.** Born 11 August 1799, at Wilmington, Delaware; died in London, England, 17 May 1840. He was educated as a lawyer, and was a member of the Philadelphia bar from 1834; he practiced his profession, however, little if at all. He was a mineralogist and chemist, and most of his published work relates to these sciences; he is best known, however, as the geologist of Major Stephen Harrison Long's expedition to the source of St. Peter's River, in 1823, and as the author of the two-volume report on that expedition, published the following year. He was a member of the Academy of Natural Sciences of Philadelphia, of which he was recording secretary from 1821 to 1825.

Kinn, Matthias. For sketch of life see BARTONIA 9: 38. 1926.

Kramsch, Samuel Gottlieb. Born 7 September 1756, at Rudolstadt, Silesia; died at Salem, North Carolina, 2 February 1824. He came to America in 1783, living first at Bethlehem, Pennsylvania, but three years later removed to Nazareth, Pennsylvania, where he was a teacher at the boys' school, Nazareth Hall. In 1788 he went to Salem, North Carolina, as minister of the Moravian church there, and at Salem he spent the remainder of his life. He was an ardent botanist, and corresponded with other botanists both in America and Europe. Three of his letters to Humphry Marshall were printed by Darlington in his "Memorials" of Bartram and Marshall.

Kunze, Gustav. Born 4 October 1793, at Leipzig, Germany; died there, 30 April 1851. He early showed marked artistic talent; this proved of great value to him in the illustration of his botanical works in later years. Even in his school days he was much interested in botany and entomology. He received his medical degree at Leipzig in 1819, and was professor of medicine there from 1822 to 1848. He also became professor of botany there in 1835, and was director of the botanic garden from 1838. He was well known for his publications dealing with fungi, ferns, and the genus *Carex*.

Latrobe, Peter. Born in 1795; died at Berthelsdorf, Saxony, 24 September 1863. His grandfather, Benjamin Latrobe, was a Moravian minister; his father, Christian Ignatius Latrobe (1758–1836), was secretary of the Unitas Fratrum in England from 1795 to his death. The son was associated with his father in supervision of the affairs of the Brethren in England from 1821, and succeeded him in 1836, so that the entire period during which he was engaged in this work was forty-two years. His headquarters were always at Fulneck in England.

***Lea, Isaac.** Born 4 March 1792, at Wilmington, Delaware; died at Philadelphia, Pennsylvania, 8 December 1886. At first a mineralogist, and later a geologist and paleontologist, and spending a large part of his long life in the critical study of the molluscan fresh-water genus *Unio,* his name is one of the best-known in the history of the natural sciences in America, yet he is rarely thought of as a botanist. However, not only do we find him listed by Schweinitz as a botanical correspondent, but he is believed to have been responsible for the keen interest of his brother, Thomas Gibson Lea (1785–1844), in botany, and a friend of his has placed on record this statement concerning him: "Nothing ever escaped his quick eye in the field or by the road-side when driving. Every tree, shrub, and flower, was full of interest to him, from which he ever imparted knowledge to his friends."

***LeConte, John Eatton.** Born 22 February 1784, near Shrewsbury, New Jersey; died at Philadelphia, Pennsylvania, 21 November 1860. He received the degree of A.B. from Columbia University in 1803. During most of his life he regarded New York City as his home, although he spent more or less of his time on a plantation in Georgia belonging to his father, and later to his brother. He and his brother Louis (1782–1838) were both interested in the natural sciences, and especially botany. His first botanical paper was published in 1811, and he was one of the founders of the Lyceum of Natural History of New York in 1817. He was an engineer in the United States army from 1818 to 1831, and was brevetted Major in 1828. Many of his water-color drawings of both plants and insects are still preserved. He removed from New York to Philadelphia in 1852, and at that time presented his herbarium to the Academy of Natural Sciences in the latter city. His later years were devoted to entomology rather than botany.

***Ledebour, Carl Friedrich von.** Born 8 July 1785, at Stralsund, Pomerania; died at Munich, Bavaria, 4 July 1851. He was educated at the university of Greifswald, but before receiving his doctor's degree there (in botany), had spent several years in Stockholm, where he made the acquaintance of Thunberg and Swartz, and had made a trip to northern Norway. For many years he was professor of botany at the university of Dorpat, and was a privy councillor of the Russian empire. Becoming professor emeritus in 1836, he spent some time in Odessa, then in Heidelberg, and finally, from 1843, at Munich. He made many important contributions to botanical literature, his best-known works being his "Icones plantarum," his "Flora altaica," and his "Flora rossica."

***Lederer, Alois Joseph Xaver von.** Born 20 May 1773; died in New York City, 22 December 1842. He was for many years Consul General in America for the Austrian states. He possessed a famous collection of minerals, a part of which became the property of the University of Michigan, and collected much herbarium material, a large part of which went to Vienna. (In my biographical notices of persons mentioned in the Schweinitz-Torrey correspondence, Mem. Torrey Club **16**: 295, he was confused with Ignaz Ludwig Paul von Lederer, 1782–1838, also an Austrian nobleman.)

Link, Johann Heinrich Friedrich. Born 2 February 1767, at Hildesheim, Hannover; died at Berlin, Prussia, 1 January 1851. His father encouraged his interest in botany when he was a mere child, and he devoted his life chiefly to this science, although he studied medicine at the university of Göttingen, and was interested in other natural sciences. From 1792 to 1811 he was professor in the university of Rostock; it was during this period that he became associated with Hoffmannsegg in work upon the flora of Portugal. In 1811 he was appointed professor at the university of Breslau, and in 1815 he went to Berlin, where he spent the remainder of his life as professor in the university and director of the botanic garden. His botanical travels took him from Sweden on the north to Greece and Italy on the south, and his numerous publications secured for him a permanent place in the history of botany.

Macbride, James. Born 17 April 1784, in Williamsburg County, South Carolina; died at Charleston, South Carolina, 21 September 1817. He graduated at Yale in 1805, and afterward studied medicine. He practiced first at Pineville, South Carolina, and afterward at Charleston. He published several botanical papers, including two in the twelfth volume of the Transactions of the Linnean Society of London. He was a close friend of Elliott, who dedicated to him the second volume of his "Sketch" and the genus *Macbridea.* At his death, from yellow fever, he was only thirty-three years old, but had already an established reputation both as physician and as botanist.

***Martius, Carl Friedrich Philipp von.** Born 17 April 1794, at Erlangen, Bavaria; died at Munich, Bavaria, 13 December 1868. He very early acquired a good knowledge of botany, and before finishing his medical course and taking his degree at Erlangen, in 1814, he had given up the idea of practicing his profession and decided to devote himself wholly to botany. Immediately, therefore, he removed to Munich and associated himself with the work of the botanic garden there, with which he was identified for the rest of his life. From 1817 to 1820 he was botanist of the Austrian expedition to Brazil, and brought back about 6,500 species of plants, to the study of which he devoted most of the remainder of his life, nearly half a century. Well-known by his other botanical writings, his fame rests chiefly upon the great "Flora brasiliensis," started by him and continued under his direction until his death, and his sumptuous history of the palms of the world. He was a professor in the university of Munich from 1826, and director of the botanic garden from 1832, retiring from both positions in 1854.

Mertens, Franz Carl. Born 3 April 1764, at Bielefeld, Westphalia; died at Bremen, 19 June 1831. He studied theology at Halle, from 1781 to 1784, and continued his theological studies while at Wandsbeck from 1784 to 1787 and for a year at his native place. In 1788 he went to Bremen, which was his home for the rest of his life. Here he was a teacher, and it was here, about 1794, that he began to take an active interest in plant study. He devoted all of his spare time to botanical field-work, and built up an herbarium that at the time of his death comprised more than 30,000 species. In 1806 the university of Halle granted his the honorary degree of doctor of philosophy, and he was a member of many scientific societies.

***Mitchell, Elisha.** Born 19 August 1793, at Washington, Litchfield County, Connecticut; died on Black Mountain (afterward named in his honor, and now known as Mount Mitchell), North Carolina, 27 June 1857. He graduated at Yale in 1813, and after a few years as a teacher, studied for a year at Andover Theological Seminary. From 1818 until his death nearly forty years later, he was a professor at the University of North Carolina at Chapel Hill. Well known as a chemist and geologist, he was a keen student of the flora of his state, and was a valued correspondent of Schweinitz and other botanists.

Mohr, Daniel Matthias Heinrich. Born 8 April 1780, at Quickborn, near Pinneberg, Holstein; died at Kiel, Holstein, 26 August 1808. He studied at

Göttingen, and there he received his degree of doctor of philosophy in 1803. He then visited Sweden, and soon afterward became a professor in the university at Kiel. He published several botanical papers before his early death, and some of his work appeared posthumously.

Moldenhawer, Johann Jacob Paul. Born 11 February 1766, at Hamburg; died at Kiel, Holstein, 22 August 1827. He was a professor at the university of Kiel from 1792 to 1827, being interested in botany in its broadest sense, including plant anatomy. Eighteen years after his death his herbarium was given to the Kiel botanic garden; it had been stored in boxes in a dry vault of a tobacco-factory, and no insects had damaged it.

Müller, Christian. He was a member of the Rappist community for many years. He was the leader of the community band as early, apparently, as 1820, and may even have been a member of the sect before its first arrival in America in 1804. He and Frederick Rapp had much in common, both having artistic taste and an interest in the natural sciences. They visited Philadelphia together in August and September 1830, and a letter still preserved records the fact that they both attended the performance of a French opera there in the latter month. At that time a Museum of Natural Curiosities had been established at Economy and Müller was in charge of it. When Schweinitz stopped at Economy during his western trip in the following year, he was much interested in visiting the museum and examining the herbarium that formed a part of it. In his journal he mentioned Frederick Rapp and Müller as if he then made their acquaintance for the first time, but it seems certain that he had previously corresponded with them.

Muhlenberg, Gotthilf Henry Ernest. Born 17 November 1753, at New Providence, now Trappe, Pennsylvania; died at Lancaster, Pennsylvania, 23 May 1815. He was educated in Germany, where he began the study of botany, which he continued diligently througthout his life. He became a Lutheran clergyman, and was pastor at Lancaster, Pennsylvania, for thirty-five years, from 1780 to 1815. His manuscripts were very detailed, but such as were published were mostly greatly abbreviated. He was in correspondence with various botanists, both at home and abroad.

***Niemann, August Christian Heinrich.** Born 30 January 1761, at Kiel; died there, 22 May 1832. His early education was at Altona, and later he studied at several German universities. Eventually he became a professor of philosophy at the University of Kiel. His interest in plants began before he was thirty years old, and showed itself in several books and a number of papers relating chiefly to forestry. He wrote on forest geography and forest statistics, and some of his writings were zoological.

***Nuttall, Thomas.** Born 5 January 1786, at Long Preston, near Settle, Yorkshire; died at "Nutgrove," near Rainhill, Prescot, Lancastershire, 10 September 1859. He was a printer by trade, but in his youth became a well-informed field-botanist. About 1808 he emigrated to America, where he devoted more and more attention to the flora of his new home, until eventually he gave up his trade altogether. In 1811 he accompanied the overland Astorian expedition up the Missouri river. His little classic, "Genera of North American plants," appeared in 1818. From the fall of 1818 to the spring of 1820 he was absent from Philadelphia on a five-thousand mile journey into the little-known Arkansas country. From 1822 to 1834 he was curator of the botanic garden at Harvard; while there he became well known as an ornithologist. In 1834 he crossed the continent, and he spent most of the year 1835 on the Pacific Coast and in Hawaii. In 1841 he returned to England, and revisited the United States only once, in 1847–48.

Olmsted, Denison. Born 18 June 1791, at East Hartford, Connecticut; died at New Haven, Connecticut, 13 May 1859. He graduated at Yale in 1813, and after a few years as a teacher, he became in 1817 professor of chemistry in the University of North Carolina; during his eight years at this post he was associated closely with his former classmate Elisha Mitchell, and his chief interest was in geology, including the direction of the geological survey of the state. It was during this period, no doubt, that his interest in botany was most apparent. From 1825 he was a professor at Yale, and during his later years his chief scientific interest was in astronomy. But throughout his life he was a teacher rather than an investigator, and exerted a wide influence in the improvement of educational methods in America.

***Pascalis-Ouvrière, Felix.** Born about 1760, in Provence, France; died in New York City, 22 July 1833. Educated in medicine at Montpellier, he went to Santo Domingo to practice his profession, but being driven out by the revolution of 1793, he settled first in Philadelphia and later in New York, which was his home for more than twenty years. His published papers were chiefly medical, but he became interested in botany while in Santo Domingo.

***Persoon, Christiaan Hendrik.** Born 31 December 1761, at the Cape of Good Hope; died at Paris, France, 16 November 1836. In his youth, and until he was about forty years old, he lived in Germany, but was not officially connected with any of the universities there. He received sufficient remittances from South Africa to keep him in comfort, and devoted all of his time to the study of plants, particularly fungi, becoming the most famous mycologist of the day. About 1803 he removed to Paris, where his financial resources gradually diminished until he was in extreme poverty. Finally, the attention of the Dutch government being called to his condition, he was allowed a sufficient pension to live on, and in return he presented his herbarium to the university of Leiden, where it is still preserved. He was the author of several of the classical works on mycology, and one on flowering plants.

***Pickering, Charles.** Born 10 November 1805, on a farm on Starrucca Creek, in northeastern Pennsylvania; died at Boston, Massachusetts, 17 March 1878. He was a member of the class of 1823 at Harvard, and received his medical degree there in 1826; it was while there that he became interested in the natural sciences, particularly botany. From 1827 to 1838 he lived at Philadelphia, being active in the work of the Academy of Natural Sciences. During the years 1838 to 1842 he was one of the most active and energetic members of the scientific staff of the Wilkes Exploring Expedition, which circumnavigated the globe, spending most of the time in the exploration of the Pacific. In 1843 he visited Africa and India, at his own expense, and upon his return settled in Boston. He was recognized throughout his life as a man of profound scholarship and encyclopedic knowledge. The work to which he devoted most of his life was his "Chronological history of plants," published the year after his death.

***Prince, William.** Born 10 November 1766, at Flushing, New York; died there, 9 April 1842. Following in the footsteps of his father as a commercial nurseryman, he established his "Linnean Botanic Garden and Nursery" in 1793, and always conducted it more for love than for profit. He aimed to cultivate every known kind of plant of horticultural value that was adapted to the climate of Long Island, introducing many from abroad. His catalogues are still needed for consultation by students of the history of American horticulture.

Rafinesque, Constantine Samuel. For sketch of life see BARTONIA 9: 41. 1926.

Rapp, Frederick (originally **Friedrich Reichert**). Born 12 April 1775, in Germany; died at Economy, Pennsylvania, 5 July 1834. He was at first a stonecutter and architect. Becoming a follower of Johann Georg Rapp (1757–1847), the social and religious reformer, he remained in Germany when the first of the Harmonists or Rappists started for America in 1804, and arranged for the transportation of the rest, accompanying the final party. He was in charge of the business dealings of the Harmony Society from 1805 until his death nearly thirty years later: at Harmony, Butler County, Pennsylvania, until 1814; at New Harmony, Posey County, Indiana, from 1814 to 1825; and at Economy, Beaver County, Pennsylvania, from 1825 to 1834. Soon after his arrival in America he assumed the name Rapp, and was recognized by the founder of the sect as an adopted son. Besides his function as business manager, guiding the community to financial success and even to wealth, he was a preacher and hymnwriter. When Schweinitz visited Economy in 1831, he met Frederick Rapp, apparently for the first time, but he seems to have reckoned him as a botanical correspondent some years earlier.

Reichenbach, Heinrich Gottlieb Ludwig. Born 8 January 1793, at Leipzig, Saxony; died at Dresden, Saxony, 17 March 1879. He began the practice of medicine at Leipzig in 1812, became a teacher of medicine and natural history at the university of that city in 1815, at the age of twenty-two, and professor three years later. In 1820 he went to Dresden as professor in the medical school there, head of the natural history museum, and director of the botanic garden. In the first of these positions he remained until 1862, in the second until 1874, and in the third until his death. He was author and editor of several important books and exsiccatae, chiefly concerned with the elucidation of the flora of Germany; the best-known of these is his "Icones florae germanicae et helveticae," a quarto with hundreds of plates, begun in 1834 and continued by his son and others until many years after his death.

Rich, William. He was a younger brother of Obadiah Rich (1777–1850), the well-known bibliographer, and was probably a native of Truro, Massachusetts. His home was in Washington, D. C., for some years; he was a member of the Botanic Club of Washington from its establishment in 1825 until its dissolution about 1830, and was one of the editors of the American Botanical Register, of which only three numbers were issued, all during approximately the same period. From 1838 to 1842 he was Botanist to the Wilkes Exploring Expedition, Asa Gray, first appointed, having withdrawn in his favor. In 1848 and 1849 he was a member of the scientific corps of the Mexican Boundary Survey, and later he was a member of one or more of the exploring parties during the Pacific Railroad Surveys of 1853–55. During these later years he was always known as Major Rich, although he seems never to have had this rank in the regular army.

***Say, Thomas.** Born 27 June 1787, at Philadelphia, Pennsylvania; died at New Harmony, Indiana, 10 October 1834. Educated as a pharmacist, he early began to devote much time to natural history. He was an energetic collector, and joined the Academy of Natural Sciences of Philadelphia in 1812, the year of its establishment. In 1825 he attached himself to the communistic settlement at New Harmony, Indiana, that had been organized the preceding year, and when the members quarreled and separated he remained in charge of the property until his death. He was an ardent student of plants, but was much better known as a zoologist than botanist, having been an authority on ornithology and conchology, and the father of American entomology.

Schrader, Heinrich Adolph. Born 1 January 1767, at Alfeld, near Hildesheim, Hannover; died at Göttingen, Hannover, 22 October 1836. He studied first at Hildesheim, and later at the University of Göttingen, where he received the degree of M.D. in 1795. A year or two later he became an instructor in the university, and in 1803 a professor in the medical faculty. At the same time he became director of the Göttingen botanic garden, and he continued to hold both positions until his death more than thirty years later. He was a member of many scientific societies, and his numerous botanical publications were highly esteemed.

***Schwägrichen, Christian Friedrich.** Born 16 September 1775, at Leipzig, Saxony; died there, 2 May 1853. He was long professor of natural history in the University of Leipzig, and was president of the natural history society of that city. It was he who published, in the Schriften of that society, in 1822, the manuscript account of Carolina fungi that had been left by Schweinitz in Germany in 1818; Schweinitz knew nothing of the publication until he received printed copies from Schwägrichen.

***Silliman, Benjamin.** Born 8 August 1779, at Stratford, now Trumbull, Connecticut; died at New Haven, Connecticut, 24 November 1864. He was a graduate of Yale in 1796. He then studied law, being a tutor at Yale at the same time, and was admitted to the bar in 1802. In the same year he became professor of chemistry and natural history at Yale. After fifty years of active service he retired in 1853, but remained professor emeritus until his death. He received the honorary degrees of M.D. from Bowdoin in 1818 and LL.D. from Middlebury in 1826. In 1818 he founded the American Journal of Science and Arts, which was long known popularly as "Silliman's Journal." His main scientific interests were in chemistry and geology; in botany his chief concern was with fossil plants.

Sprengel, Curt Polycarp Joachim. Born 3 August 1766, at Boldekow, near Anklam, Pomerania; died at Halle, Saxony, 15 March 1833. He graduated in medicine at the University of Halle in 1787, and immediately became a member of the faculty. Two years later he became professor of medicine and the history of medicine, and in 1797 professor of botany. This professorship he held for the remainder of his life, in spite of invitations from the universities at Marburg, at Dorpat, and at Berlin. From 1797 also he was in charge of the Halle botanic garden, and he became one of the foremost of European botanists, publishing many books, some of which are still regarded as classics. An uncle and two sons were also botanists.

***Steinhauer, Daniel.** Born in 1785, in Wales; died at Bethlehem, Pennsylvania, in 1852. He followed his brother Henry to America, and taught in various Moravian schools: at Zanesville and Newark in Ohio; at Philadelphia, Lancaster, Nazareth, and Bethlehem, in Pennsylvania. He made one trip from Louisville, Kentucky, where he was then living, to Cheneyville, Louisiana, where he collected plants for Short; this was in 1839.

Steinhauer, Henry. Born in February, 1782, at Haverford West, South Wales; died at Bethlehem, Pennsylvania, in July, 1818. He was educated at the Moravian Theological Seminary at Barby, Silesia. After teaching for a few years at Fulneck, in Yorkshire, the chief Moravian settlement in England, he retired on account of poor health, and lived first in London, and later at Bath. In 1815 he came to America, and from 1816 until his early death only two years later he was principal of the Moravian seminary for young ladies at Bethlehem. The year before his death he became a member of the American Philosophical Society; he read before this society, 2 May 1817, a paper on fossil plants in coal strata, that was published in their Transactions.

Steudel, Ernst Gottlieb von. Born 30 May 1783, at Esslingen, Württemberg; died there, 12 May 1856. He graduated in medicine at Tübingen in 1805, and lived to celebrate his fiftieth anniversary as a practitioner of his profession in his native city. The king of Württemberg on that occasion made him a baron, the "von" in his name thus dating from less than a year before his death. He is best known to botanists for his work on grasses and sedges.

Thiébaut de Berneaud, Arsenne. Born 14 January 1777, at Sedan, Ardennes, France; died at Paris, 3 January 1850. Of an old family celebrated in the history of Champagne and Lorraine, he was an ardent supporter of the French republic. He served as an officer in the republican army, and later in various civil posts; in later life he was for many years in charge of the Mazarin library in Paris. He was both botanist and horticulturist, most of his published writings dealing with cultivated plants. He was a member of numerous societies, and was secretary of the Linnean Society of Paris.

Thorburn, Grant. Born 18 February 1773, at Dalkeith, near Edinburgh, Scotland; died at New Haven, Connecticut, 21 January 1863. He emigrated to America in his youth, and started a notion store in New York. He sold flowerpots; then he put plants in them, and sold both; then he arranged with the man from whom he bought the plants to grow seeds, and sold them; and thus arose one of the first seed-stores in the United States. This was in 1805, and his seed business soon warranted the issuing of catalogues, followed by more pretentious works on gardening. He also wrote various books on other subjects, and contributed to newspapers under the pen-name "Laurie Todd."

***Torrey, John.** Born 15 August 1796, in New York City; died there, 10 March 1873. He graduated in medicine at the College of Physicians and Surgeons of his native city in 1818, and practiced his profession for a few years, although his interest was even then greater in botany than in medicine. From 1824 to 1827 he was a professor at the United States Military Academy at West Point, from 1827 to 1855 at the College of Physicians and Surgeons, and from 1830 to 1855 at Princeton, holding the last named professorships concurrently for about twenty-five years. His teaching was almost entirely in chemistry, geology, and mineralogy, yet his fame rests chiefly upon his work in botany, the science closest to his heart. For many years the plants collected by various government expeditions to the middle and western states were placed in his hands for study, and report after report evidenced the thoroughness of his work upon them. Besides these, he published various monographs and floristic works. The Torrey Botanical Club of New York, the oldest botanical society in the United States, was named in his honor during his lifetime. The letters of Schweinitz to Torrey and of Torrey to Schweinitz, in so far as they have been preserved, have been published in full, with portraits of both (Mem. Torrey Club **16**: 119–281. 1921).

***Volz, Friedrich.** A pharmacist of Stuttgart, Württemberg, who undertook, in 1830, a trip to the United States for the express purpose of collecting herbarium specimens in the southeastern states for European botanists. When he landed in New York he learned of the death of Elliott, and there seems to be some doubt whether he actually went south. He did, however, collect in Pennsylvania, as far west as Pittsburgh. It was his intention to spend about two years in America; whether he ever returned to Germany is uncertain.

Wallich, Nathaniel (originally **Nathan Wolff**). Born 28 January 1786, at Copenhagen, Denmark; died at London, England, 28 April 1854. He studied medicine, and became in 1807 a surgeon at Serampore, India, then a Danish settlement. In 1814 he entered the service of the East India Company, and was thereafter a loyal British citizen. From 1815 to 1841 he was superintendent of the Calcutta Botanic Garden, then the highest botanical position in India. For several years, from 1828, he was in England, and he finally retired to London in 1847. Thousands of herbarium specimens collected by him (including, it is believed, many collected by his predecessor Roxburgh) were distributed in sets to various herbaria, and the first set is today one of the highly-prized treasures of the herbarium at Kew. His ''Plantae asiaticae rariores,'' in three folio volumes, is among the most sumptuous of botanical works.

***Welden, Franz Ludwig von.** Born 10 June 1782, at Laupheim, Württemberg; died at Graz, Styria, 7 August 1853. From 1799, when he was only 17 years old, until his retirement in 1851, he was in the service of the Austrian army, rising from grade to grade until he was master of ordnance. For many years he was an occasional contributor to botanical literature, and was well known as a patron of horticulture.

Wesselhoeft, William. Born in 1794, in Germany; died at Boston, Massachusetts, 1 September 1858. He was educated in medicine in Germany, and emigrated to America while still a young man, practicing his profession first at Bath, Northampton County, Pennsylvania, and becoming a homeopathist about 1825. He was at Allentown, Pennsylvania, from 1836 to 1839, and then at Boston for the remainder of his life.

Wistar, Caspar. Born 13 September 1761, at Philadelphia, Pennsylvania; died there, 22 January 1818. He studied medicine, receiving the degree M.B. in Philadelphia in 1782 and M.D. at Edinburgh, Scotland, in 1786. Returning immediately to America, he practiced his profession and taught in the medical schools of Philadelphia for more than thirty years, becoming a famous surgeon and playing a prominent part in the social life of the city. He was long active in the work of the American Philosophical Society, and was its president at one time. He took an active interest in botany, and several plants bear his name.

Wray, Thomas P. A physician at Augusta, Georgia, for many years; from 1812 to 1835 at least. Plants collected by him are to be found in various herbaria, and *Coreopsis Wrayi* was named for him by Nuttall.

***Zeyher, Johann Michael.** Born 26 November 1770, at Oberzenn, near Ansbach, Bavaria; died at Schwetzingen, Baden, 20 April 1843. Educated at Ansbach, he became a gardener, and spent several years at Basel, in Switzerland. In 1804 he was appointed head-gardener at the garden of the grand duke of Baden at Schwetzingen, and two years later was made director of the same garden, where he spent the remainder of his life. He was the author of several books and contributions to periodicals, chiefly relating to horticultural botany. He was the uncle of Carl Ludwig Philipp Zeyher (1799–1858), who long lived at Cape Town and was famous as a collector of South African plants.

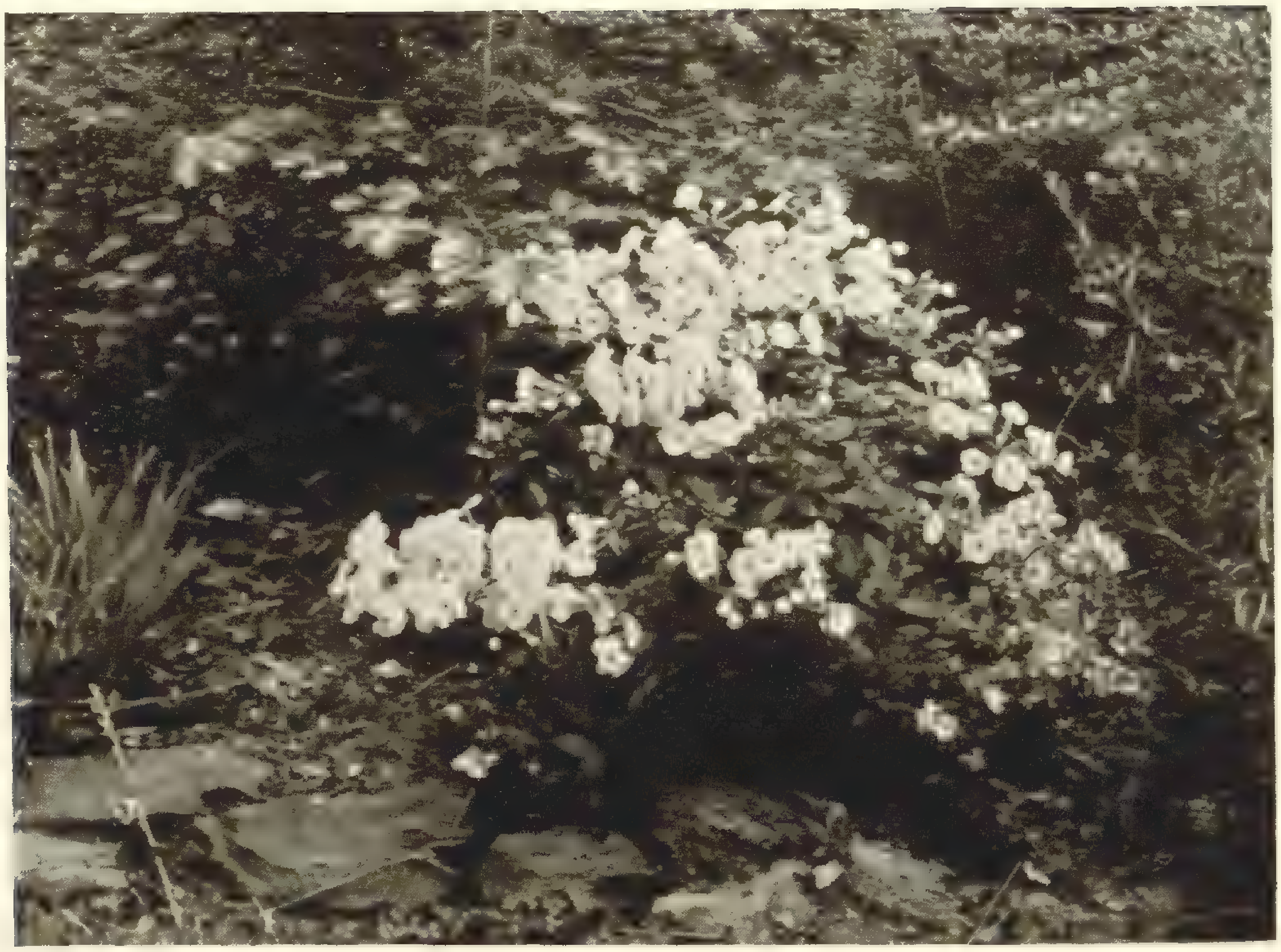

FIG. 1. *Phlox ovata pulchra,* var. nov.
In cultivation; originally from Walker County, Alabama.

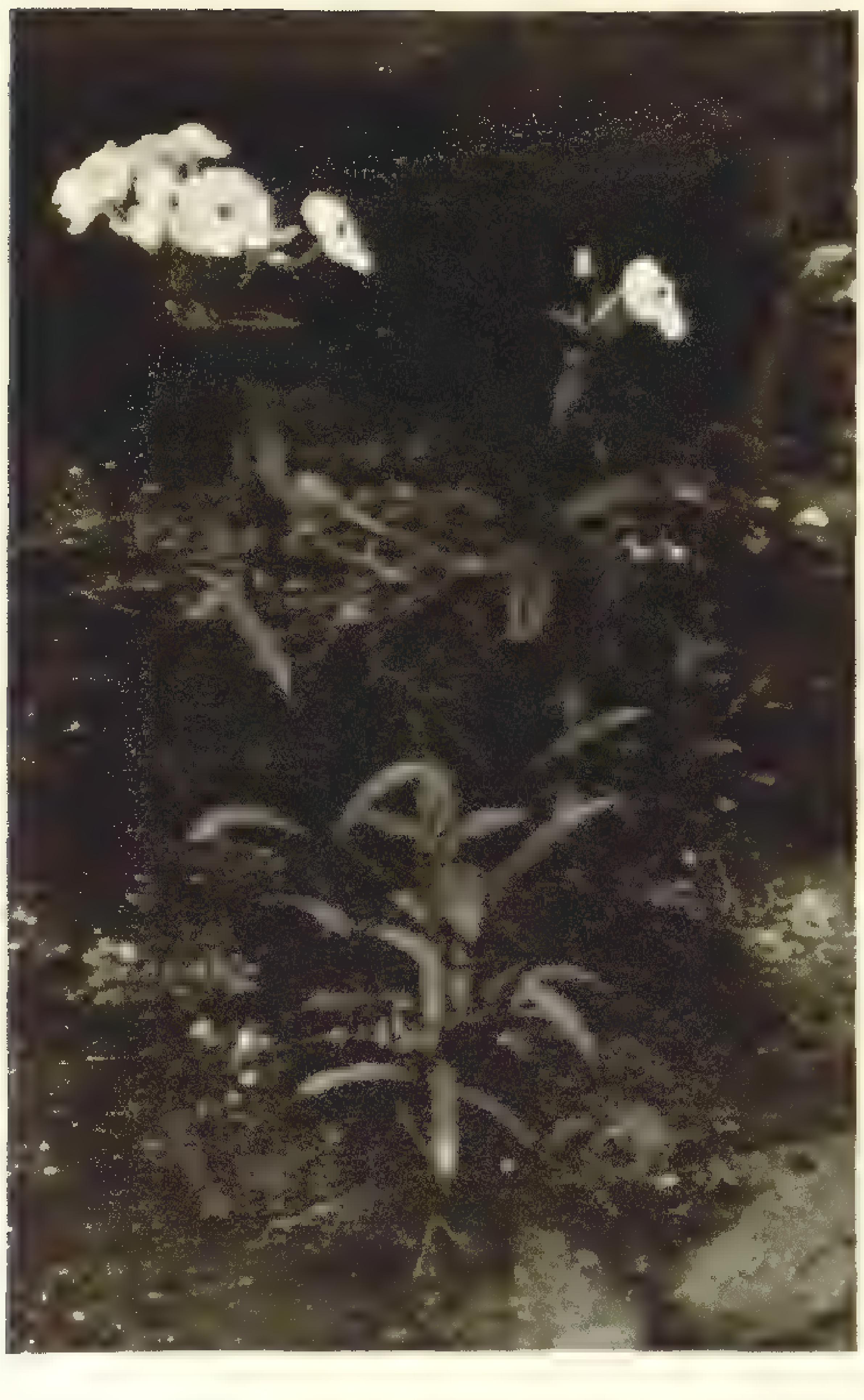

FIG. 2. *P. ovata pulchra.*
Slender plant, as above.

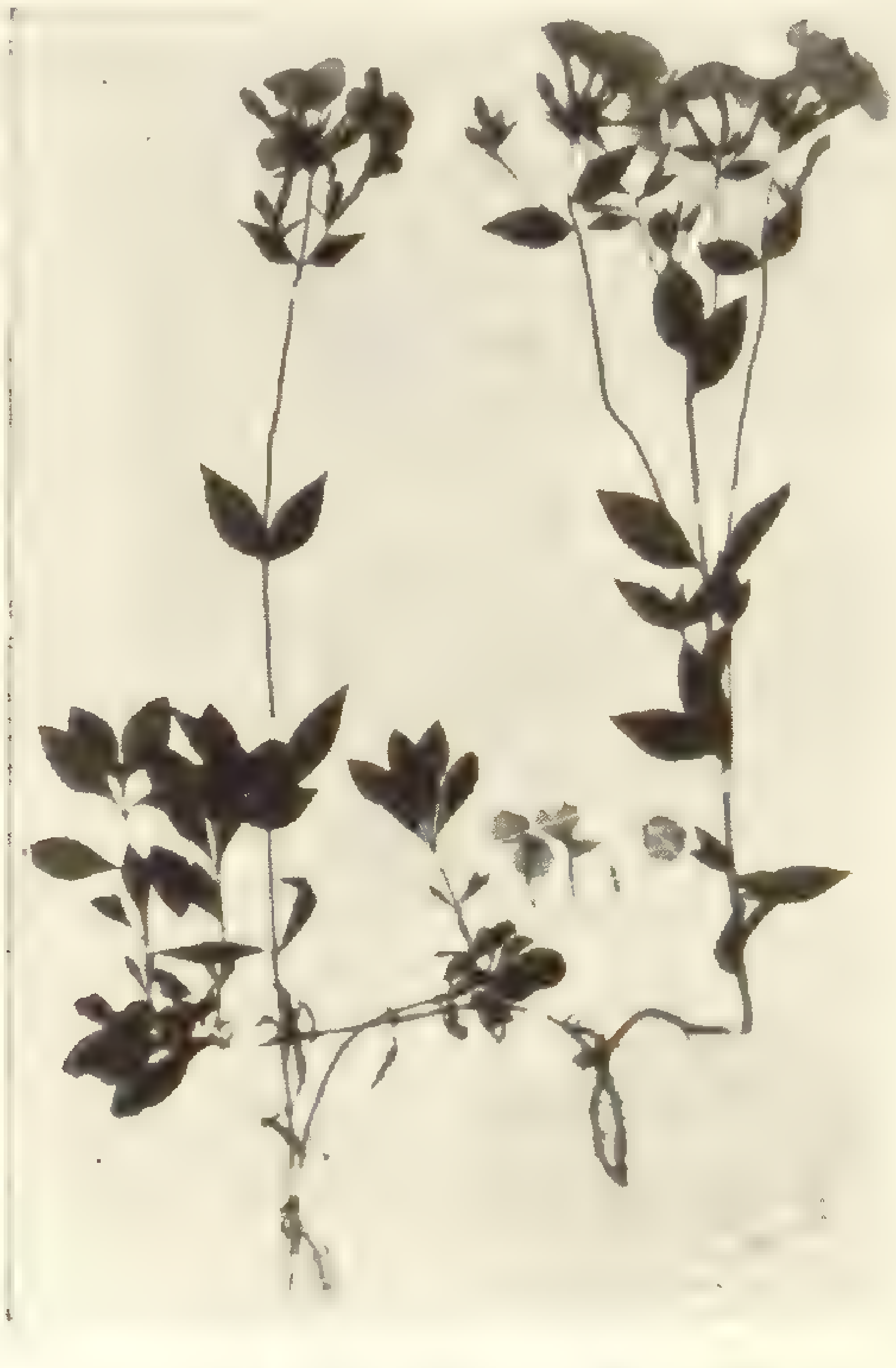

FIG. 3. *P. ovata pulchra.*
Type specimen.

A Variety of Phlox ovata from the Alabama Mountains[1]

EDGAR T. WHERRY

While driving along Alabama State Highway No. 18 east of Oakman, Walker County, in May, 1929, I noticed in two or three ravines a *Phlox* of the Section Ovatae with unusually large flowers of a brilliant pink color. The locality being within the range of *P. carolina heterophylla* (Beauvais) Wherry, the plant was at first regarded as a pallid color form of this variety,[2] but further study indicates that it belongs rather with *P. ovata* Linné. Because of the striking beauty of its flowers it may be known as:

Phlox ovata pulchra, var. nova. Plate 2

Crown producing decumbent sterile shoots up to 15 cm. long, their terminal leaves evergreen but withering early in Spring, and new shoots then arising from their tips; sterile shoots conspicuous at flowering time, 10 to 20 cm. tall; flowering shoots arising in part from old crowns and in part from the end of decumbent shoots, 30 to 50 cm. tall, with 4 to 6 nodes below the inflorescence. Leaves elliptic to somewhat ovate or obovate, the lower short-petioled, the upper sessile. Inflorescence tending to be compound, with branches arising from upper leaf-axils. Calyx exceptionally large, the sepals around 12.5 mm. long, united to somewhat more than half their length. Corolla also large, the tube 23 to 26 and lobes 14 to 16 mm. long. Styles 22 to 24 mm. long.

(Caules steriles decumbentes usque ad 15 cm. longi foliis terminalibus sempervirentibus; caules floriferi 30–50 cm. alti 4–6 nodis sub inflorescentiam; folia elliptica inferioribus brevipetiolatis; calyx corollaque majores.)

Reasons for classing this plant as a geographic variety of the hitherto undivided *Phlox ovata* comprise: the presence of conspicuous sterile shoots with partially evergreen leaves, which showed up when the plant was observed under cultivation; the relatively small number of nodes on the flowering shoots; and the large size of the calyx and corolla. Differences from the widespread phase of the species, which must now be assigned to varietal status, can best be brought out by a geographic tabulation, such as has been used in the discussion of several other species:

DECUMBENT SHOOTS RELATIVELY LONG; LOWER LEAVES SHORT-PETIOLED; NODES 4 TO 6 BELOW INFLORESCENCE.	DECUMBENT SHOOTS RELATIVELY SHORT; LOWER LEAVES LONG-PETIOLED; NODES 3 TO 5 BELOW INFLORESCENCE.
Phlox ovata pulchra Wherry, var. nov. Typified by specimen from open woods 1 mile east of Oakman, Walker Co., Ala., collected by E. T. W. May 8, 1929. Known only from this county, and as a pallid color-form.	**Phlox ovata latifolia** (Michaux) Wherry, status novus. *P. ovata* Linné. *P. latifolia* Michx. *P. carolina* α *ovata* Bentham. The widespread variety, NW. Ga. to N. Ind. and Ohio and to E. Pa.

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[1] Contribution from the Botanical Laboratory and Morris Arboretum of the University of Pennsylvania.

[2] Bartonia 13: 36. 1931.

Phlox ovata pulchra forms a connecting link between *P. ovata latifolia* and the early-blooming varieties of *P. carolina,* as shown in the following table:

species and variety	*decumbent shoots*	*nodes*	*sepal-length*
ovata latifolia	prominent, 5–10 cm. long	3– 5	8.5–12.5 mm.
ovata pulchra	prominent, 10–15 cm. long	4– 6	
carolina triflora	obscure, 15–20 cm. long	6–12	8–11 mm.
carolina heterophylla	obscure, 20–30 cm. long	8–20	

This newly recognized *Phlox* has considerable horticultural promise. As shown in the photograph reproduced at the top of plate 2, it forms a compact clump and bears (in May and June) an abundance of good-sized flowers. In color these are most attractive, ranging from a soft peach-blossom pink to delicate rose color and occasionally to white. It prefers a sandy, moderately acid soil in partial shade, and seems to be entirely hardy, having withstood temperatures of 15° below zero without apparent injury.

Supplementary Notes on the Eastern Phloxes[1]

Edgar T. Wherry

The fifteen species of *Phlox* known to occur native east of the Mississippi River have been treated in a series of articles published in the past five issues of this journal;[2] additional data upon them are here presented. The characters of the several sections, enumerated in the introductory discussions of each, will first be given in the form of a key:[3]

KEY TO SECTIONS OF EASTERN PHLOXES

- Stems woody, trailing or decumbent, with latent shoots well-developed at flowering time; leaves mostly persistent, narrow; inflorescence a cyme of few long-pedicelled flowers......§1. Subulatae.
- Stems herbaceous, decumbent to erect, with latent shoots little developed at flowering time; leaves sparingly persistent or all deciduous, of various shapes; inflorescence a cyme, corymb or panicle of few to many short-pedicelled flowers.
  - Sepals normally united to half their length or less, terminally long-awned; stamens and styles much shorter than the corolla-tube......§2. Divaricatae.
  - Sepals normally united to half their length or more, terminally short-awned or awnless; one or more stamens and styles nearly or quite equalling the corolla-tube.
    - Leaves with obscure lateral veins and smooth or slightly roughened margins; anthers deep yellow......§3. Ovatae.
    - Leaves with prominent areolate veins, the margins ciliolate-serrulate with stiff bristles; anthers pale yellow to white......§4. Paniculatae.

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[1] Contribution from the Botanical Laboratory and Morris Arboretum of the University of Pennsylvania. Presented at the meeting of the Philadelphia Botanical Club, December 20, 1934.

[2] Bartonia 11: 5. 1929; 12: 24. 1931; 13: 18. 1932; 14: 14. 1932; and 15: 14. 1933.

[3] Slightly modified from that contributed to Small's Manual of the Southeastern Flora. 1101. 1933.

The species are distributed in these sections as follows:

SUBULATAE	DIVARICATAE	OVATAE	PANICULATAE
P. nivalis	*P. divaricata*	*P. stolonifera*	*P. amplifolia*
P. subulata	*P. pilosa*	*P. buckleyi*	*P. paniculata*
P. bifida	*P. floridana*	*P. ovata*	
	P. amoena	*P. carolina*	
		P. glaberrima	
		P. maculata	

Several readers have been so good as to send in criticisms and suggestions concerning the papers on the eastern Phloxes. One question requiring discussion was why, under each species, the states were listed alphabetically instead of geographically, as is so frequently done. In my opinion the usual geographic plan, listing first the Atlantic seaboard states from Maine to Florida, and then the states further west in an order which varies in accordance with individual preferences, is open to two objections. The first is the difficulty of finding any one state unless the exact order selected by each author is known. Second, there is the implication from a list running southward from Maine and westward from the coast that the plants concerned have migrated from north to south and from east to west. Actually the last great plant migration of eastern North America consisted in a northward movement following the warming up of the climate and the retreat of the great ice sheets which covered much of the country down to latitude 41° a few thousand years ago. Some species of course survived that glacial epoch in coastal states and subsequently spread westward; but others survived west of the Appalachians, and have since moved eastward instead. As it would be impracticable to arrange the localities of each species in an order bringing out the exact course of its migration, and as after all the purpose of listing by states is really only a matter of indexing, the alphabetical plan seems the most satisfactory one. The maps accompanying each species-discussion enable the ranges to be visualized better than any list of states.

The following additions and corrections to the previously published articles have come to my attention. Some of the county records represent recent accessions to herbaria previously examined, while others have been obtained from the Rocky Mountain and other western herbaria. A few have been taken from new local floras. Thanks are due to several botanists who have generously contributed specimens from their regions. As before, the symbol ′ signifies that material from the designated county has been seen in fresh condition, in the course of field trips.

Phlox nivalis Loddiges

Page 12. ALABAMA: Two visits to Montesano, Madison County, having failed to yield specimens of this *Phlox*, the last three text-lines should be deleted. A small form of *P. pilosa* occurs there and has evidently been mistaken for it.

P. 13. Florida: Add Columbia^f, Okaloosa^f, and Pasco counties. Georgia: Add Bibb, De Kalb^f, and Rockdale^f counties. [Louisiana: Not yet collected, but probably present at least centrally.] [Mississippi: Chapman's record, doubted in the previous discussion of this species, may have been authentic, for the plant must have traversed the southern portion of this state in reaching its recently discovered Texan localities.] North Carolina: Add Burke^f, Caswell, Catawba^f, Cumberland^f, Guilford, Harnett, Montgomery^f, Polk, and Rutherford counties. South Carolina: Add Barnwell^f and Orangeburg counties. Texas: The most remarkable extension of range recorded herein consists in the finding of this species in Hardin and Tyler counties in this state by Miss Eula Whitehouse in 1931. The westernmost station heretofore definitely known was in Okaloosa County, Florida, 500 miles away, but there may be colonies between. Virginia: Now known to extend into Nottaway County, to latitude 37° 10′ north.

Phlox subulata Linné

Page 21. [Connecticut: Add Middlesex^z County.] [Indiana: Reported in Clark, Jefferson, Kosciusko, Montgomery, St. Joseph, and Tippecanoe counties, but probably merely an escape in most of them.] [Iowa: Escaped in two counties, Fayette^z and Page^z.] Kentucky: Add Estill County. [Maine: Add Kennebec^z, Sagadahoc^z, and York^z counties.]

P. 22. Maryland: Add Baltimore^f and Frederick^z counties. [Massachusetts: Add Berkshire^z and Hampden^z counties.] Michigan: Add Calhoun, Gratiot^z and Livingston counties. [New Hampshire: Escaped in Belknap^z and Carroll^z counties.] New Jersey: Add Cumberland^z, Morris, and Sussex^f counties. New York: Add Allegany, Schenectady^z, and Washington^z. Ohio: Add Erie, but delete Jefferson County.

P. 23. Ohio: Add Ottawa, Ross, and Tuscarawas counties. Pennsylvania: Add Adams^f, Butler, Carbon, Indiana, Lebanon, Montour, and Westmoreland, total 34 counties. [South Carolina: Escaped in Aiken^z and Berkeley^z counties] [Vermont: Add Chittenden^z and Rutland^z counties.] Virginia: Add Craig^f, Giles, Highland^f, Montgomery, Nelson, Roanoke^f, and Wythe^f counties. West Virginia: Add Wayne County.

Phlox bifida Beck

Page 30. Arkansas: Add Benton and Newton counties.

P. 31. Illinois: Delete last sentence, as it is now known farther north in Iowa. Indiana: Add Laporte, St. Joseph, and Starke counties. Iowa: The statement should read: "Recorded from Benton, Black Hawk, Fayette, and Muscatine counties, the third being the northernmost point the species is known to reach." Kansas: Change the first sentence to: "Specimens have been seen from Cowley and Pottawattamie counties," and delete the second sentence, since other outliers are now known. Missouri: Add Madison, Randolph, Reynolds, and Taney. Oklahoma: An interesting extension of range consists in the finding of this species (reported[4] as *P. longifolia* Nuttall) by Mr. H. C. Benke at Mooreland, Woodward County, at 99° 15′ west longitude. This lies 150 miles west of Cowley County, Kansas, the previously recorded limit. Specimens seen represent the northern variety, in both glandular and eglandular forms. [Texas: Mr. Benke reports the same species, northward.]

P. 33. In the last sentence change the initial "No" to "Little," since colonies in which pink flowers occur have been reported by Clute.[5]

Phlox divaricata Linné

Page 26. In discussing white forms in the second paragraph on this page, one name was overlooked: *P. d. candida* Wetzstein.[6] This has priority over *albiflora*, although whether it represented a pallid or an albino plant is not known.

P. 28. Arkansas: Add Lonoke and Van Buren counties. Illinois: Add Lawrence County. Indiana: Add Boone and Henry counties.

P. 29. Indiana: Add on this page Pike and Whitley. Iowa: Add Audubon, Boone, Clarke, Lee, Muscatine, Warren, and Woodbury counties. Kansas: Add Franklin County. Kentucky: The county list can now be enlarged 25 per cent by adding Bell, Daviess, Henderson, Owen, and Pendleton. Maryland: Frequent in Harford^f County. Michigan: Add Midland, Tuscola, and Van Buren counties.

P. 30. Missouri: Add Boone, Lincoln and Saline counties. New York: Add Allegany, Cayuga, Lewis, Livingston, Madison, Tioga, and Wayne counties. Ohio: Add Ashtabula, Lake, and Mahoning counties.

[4] Rhodora **34**: 5–6. 1932.

[5] Amer. Botanist **39**: 128. 1933.

[6] Proc. Ohio State Acad. Sci. **4**: 361. 1906.

P. 31. Oklahoma: Add Adair^{f}, Cherokee, and Muskogee. Pennsylvania: Now known from five more counties, three northern: Crawford, Indiana, Jefferson, McKean, and Perry. Tennessee: The western variety has now been found in Humphreys County, the eastern in Morgan. Virginia: Add Arlington, Bath^{f}, and Warren counties. West Virginia: Add Taylor^{f} County. Wisconsin: Add Dodge, Juneau, and Kewaunee counties.

P. 32. Ontario: Add Dundas, Middlesex, Waterloo, Wellington, and Wentworth counties. [MEXICO: In the interest of completeness a record should be made of the report of *Phlox divaricata* by Sessé and Mociño[7] at Apatzingam in the State of Michoacan. Their description shows, however, that the plant to which the name was applied was not this species, nor indeed a member of the genus *Phlox* at all.]

Phlox pilosa Linné

Page 39, last line, before "Appalachians" insert "northern."

P. 40. Alabama: Add Geneva^{f} County. Arkansas: Add Cross^{f}, Madison, Pike, Polk, Sebastian^{f}, and Woodruff^{f} counties. Florida: Add Escambia County. Georgia: Add Clarke and Lowndes counties. Illinois: Add De Witt, La Salle, Vermilion, and Woodford counties.

P. 41. Indiana: Several records not based on specimens were previously omitted, but are probably authentic: Daviess, Dearborn, Gibson, Jefferson, Johnson, and Knox. Iowa: This state has the most new county records, all of the prairie variety: Boone, Cerro Gordo, Greene, Hardin, Mills^{f}, Muscatine, Scott, Union^{f}, Warren and Wright. Kentucky: Add Nelson County. Louisiana: Add Bienville^{f}, Jefferson Davis, Red River^{f}, and Sabine Parishes. Maryland: Add Howard County. Michigan: Add Calhoun, Eaton, and Genessee counties. Minnesota: Add Clay and Cottonwood counties.

P. 42. Minnesota: Add Norman on this page. Missouri: Add Adair, Boone, Camden, Lewis, and Perry counties. Nebraska: Collected by Dr. James in 1820 in what is now Platte County, which should be added to the list. New Jersey: Add Mercer County. North Carolina: Here the number should be reduced by one, since the record for Polk County proves to have been erroneous, the species being *P. amoena*. Ohio: Add Adams, Clark, Highland, and Jefferson. Oklahoma: Add Adair^{f}, Bryan, Caddo, Cleveland, Jefferson, and Tulsa counties.

P. 43. Pennsylvania: Add Adams^{f} County. South Dakota: Add Minnehaha County. Tennessee: Add Marion County. Texas: Add Anderson and Hays counties. Wisconsin: Add Adams, Douglas, and Sawyer counties.

P. 47. Acting upon the suggestion that the plant here termed *P. p. fulgida* might be a distinct species, Mrs. Fannie M. Heath[8] proposed for it the name *P. wherryi*.

Phlox floridana Bentham

Page 48. Alabama: Collected in early July, 1932, in Coffee^{f}, Covington^{f}, Henry^{f}, and Houston^{f} counties. Florida: Add Madison and Okaloosa^{f} counties, the latter representing a range-extension to longitude 86° 30′ west. Georgia: On the 1932 trip 7 new county records were obtained: Clay^{f}, Decatur^{f}, Early^{f}, Grady^{f}, Mills^{f}, Seminole^{f}, and Webster^{f}. The last is a range-extension northward to latitude 32°, though not bringing it to the Fall Line. *Variation:* Pallid forms, showing a color range to palest phlox-pink, were found at several of the new stations. As typical may be recorded specimen from 5 miles northeast of Beachton, Grady County, Ga., E. T. W., July 7, 1932.

Phlox amoena Sims

Page 50. Map, Fig. 4: In the course of printing, a blemish resembling the dots used to designate counties appeared in southern Louisiana; it should be stricken out. Alabama: Add Jackson^{f} County. Florida: Add Jefferson and Putnam counties; remarkably enough, the northern variety is represented in these.

P. 51. Georgia: Add Lumpkin^{f}, Toombs^{f} and Ware counties. [Indiana: Reported by Coulter[9] from three counties, but no specimens are extant, and as the species is not otherwise known to occur above southernmost Kentucky, a form of *P. pilosa* is thought to have been mistaken for it.] Mississippi: The occurrence in Wayne^{f} County has been confirmed, and it has also been collected in Greene^{f}. South Carolina: A recent collection in Saluda County extends the range of the southern variety into the Piedmont. Tennessee: Add Roane and Wayne counties.

[7] Plantae Novae Hispaniae: 26. 1887.

[8] Nat. Hort. Mag. 8: 204. 1930.

[9] Cat. Flg. Plts. & Ferns Indiana: 890. 1900.

Phlox stolonifera Sims

Page 22. Georgia: Add Lumpkin^{f} County. Kentucky: Lewis County. [Missouri: The statement should read "An unsubstantiated report by Tracy."] North Carolina: Add Jackson, McDowell, and Mitchell counties. Pennsylvania: Center County is no longer a limit, as the species is now known in Elk, Jefferson, and Lancaster counties, the first bringing it to latitude 41° 30′ north. [Vermont: Add Caledonia^{x} County.]

P. 23. Virginia: Add Highland^{f} County. West Virginia: Add Randolph^{f} County.

Phlox buckleyi Wherry

Page 24. Virginia: Collected in 1932 in Craig^{f} County and and the present year, in Augusta County. West Virginia: Pocahontas^{f} County also added in 1932.

Phlox ovata Linné

Page 26. Alabama: A new variety from Walker^{f} County is discussed in the preceding article.

P. 27. North Carolina: Add Guilford, Haywood^{f}, and Mitchell counties. Pennsylvania: Add Snyder County. Tennessee: Add Grainger and Union counties. Virginia: Add Craig^{f} County.

Phlox carolina Linné

Page 32. Alabama: Add Cherokee^{f}, Clarke^{f}, and Henry counties. Georgia: Add Dawson, Habersham, Oconee, Towns^{f}, Union^{f}, and Walker counties. Indiana: Add Jefferson County.

P. 33. Kentucky: Add Bourbon and Wolfe counties, but delete Marshall. North Carolina: Add Davidson, Orange, Rutherford^{f}, and Wake^{f} counties, the last an eastward range-extension to west longitude 78°. Ohio: Add Butler, Highland, Pike, and Scioto^{f} counties. South Carolina: Delete Abbeville and add Lexington. Tennessee: Add Blount, but delete Haywood and Madison. Virginia: Add Albemarle, Amherst^{f}, and Pulaski.

Phlox glaberrima Linné

Page 15. Alabama: Add De Kalb^{f}, Jackson, and Jefferson^{f} counties. Florida: Add Liberty County.

P. 16. Georgia: Add Chattooga^{f} and Rabun counties. Illinois: Add Iroquois^{f} County.

P. 17. North Carolina: Add Cleveland^{f}, Gaston^{f}, Montgomery^{f}, Moore^{f}, and Stanly^{f} counties. Ohio: Delete Butler and Highland counties. Oklahoma: Now known in McCurtain County. South Carolina: Material from Abbeville County previously classed as *P. carolina* is now considered to be *P. glaberrima;* add also Richland County. Tennessee: Add Blount County. Virginia: A fitting climax to this series of studies consists in the rediscovery of *Phlox glaberrima* in Virginia, where it had not been found since Clayton's day, an interval of over 200 years. The station is in the western part of Chesterfield County, and was brought to attention in the Spring of 1933. It lies on one of the lines indicating Clayton's travel-routes on the map in Gronovius's Flora Virginica, and exhibits marked variability in flower color, a feature specially mentioned by Clayton. The suggestion previously made that the species was probably found in Gloucester County is therefore to be withdrawn, and this newly recognized occurrence is to be regarded as the real type locality of the species, and, indeed, of the genus *Phlox*. In Plate 3 there is reproduced a general view of the *Phlox* as it grows here, and also a near view of one plant, in comparison with the Linnean type of the species, to show their resemblance. The colony is not a large one, and could readily be exterminated by digging of roots, so horticulturists are urged not to disturb it. The soil is strongly acid and sterile, and the plant can not be expected to thrive under cultivation in rich garden loam. Since it has managed to survive all the clearing, burning, and road-making operations of the past two centuries, we should give it a chance to continue to live here indefinitely.

P. 19. Line 22 of Tabulation, for "SW. Mo." read "SE. Mo."

Phlox maculata Linné

Page 22. Connecticut: Now known at Straitsville, in New Haven County, as a native plant.

P. 23. [Nebraska: Reported by Petersen[10] from Otoe County; this, if confirmed, would be a considerable westward range-extension.] New York: Add Chenango County.

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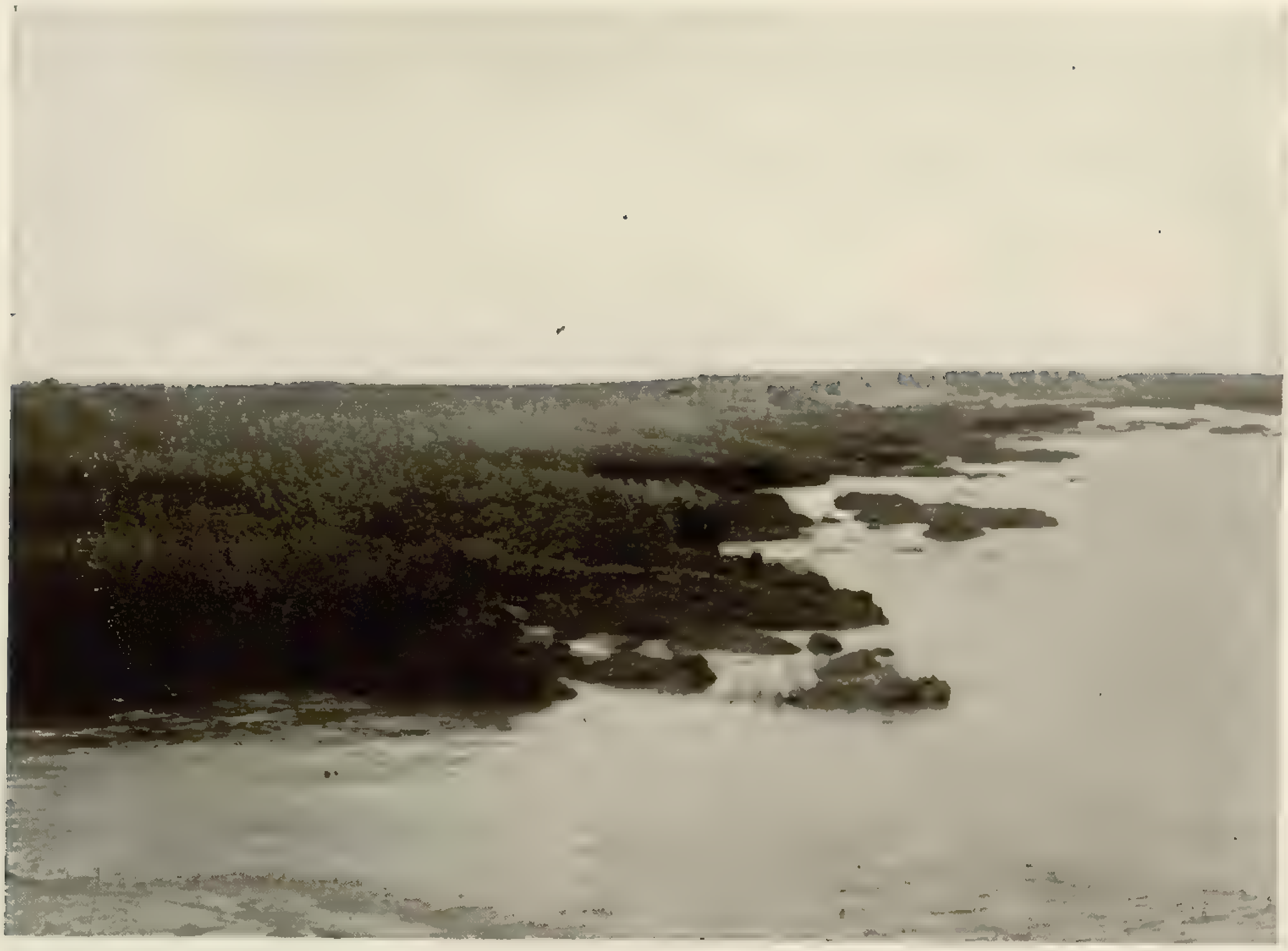
[10] Flora Nebraska: 96. 1912.



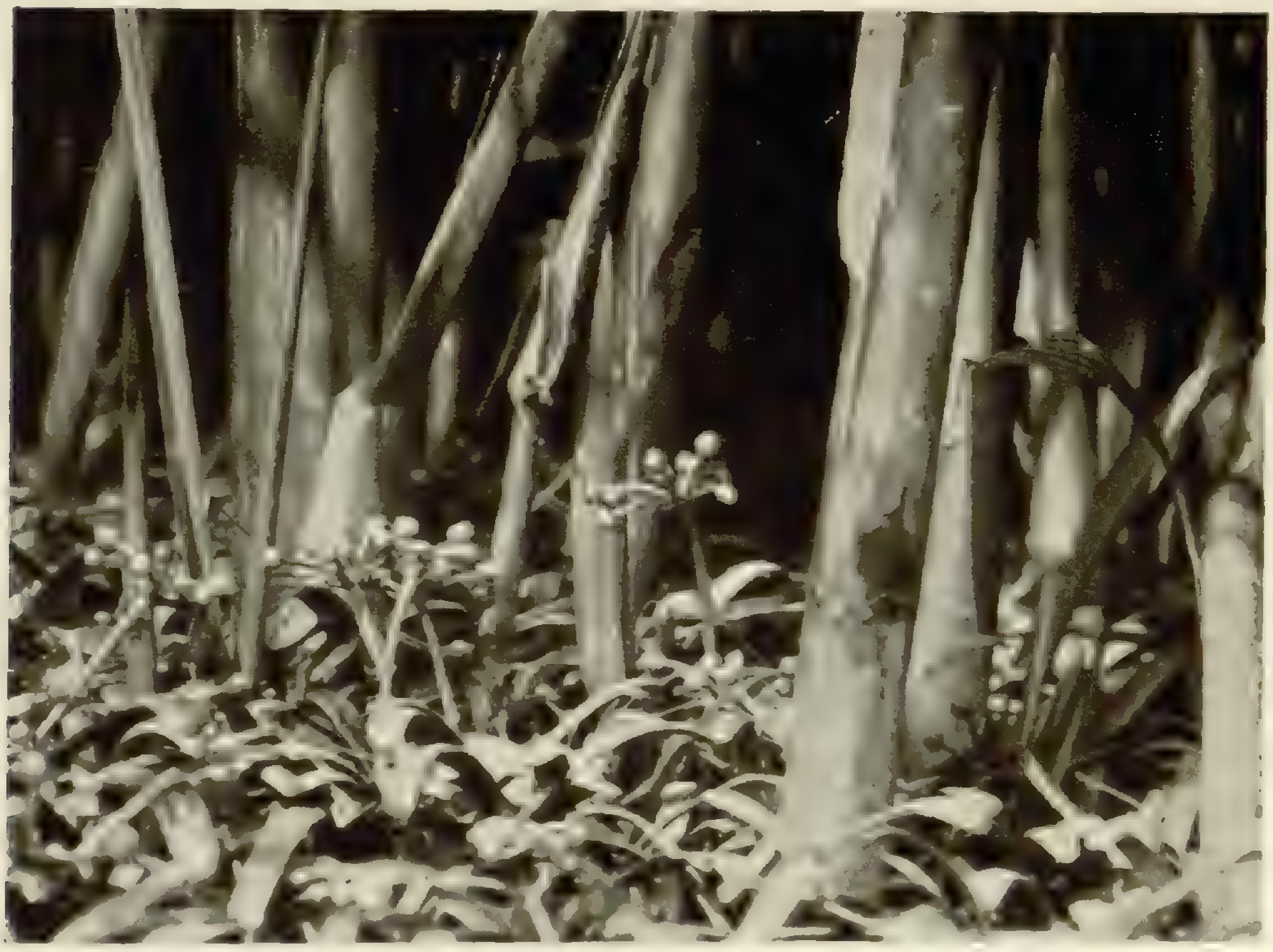


FIG. 1 (above). The irregular peaty shore of Delaware Bay near Fraland Beach.
FIG. 2 (below). *Lilaeopsis chinensis*, natural size, Fraland Beach, July 15, 1934.

PHOTOGRAPHS BY K. D. DOAK.

P. 24. PENNSYLVANIA: Add Schuylkill County. TENNESSEE: Delete Benton County, leaving the species unknown on the Coastal Plain in this state. VIRGINIA: Add Carroll[f] and Pittsylvania[f] counties. WEST VIRGINIA: Add Hampshire, Kanawha, Mercer, Mineral, Mingo, and Monongalia counties. [MEXICO: Among the Phloxes reported from this country by Sessé and Mociño[11] was included *P. maculata*, the locality being given as ''In Oppidio Sancti Angeli, prope Mexici.'' The data indicate that some other plant was represented, probably not belonging to this genus.]

Phlox amplifolia Britton

Page 16. KENTUCKY: Add Powell, Warren, and Wolfe counties. NORTH CAROLINA: Add Swain County. TENNESSEE: Add Blount and Sevier counties; one specimen represents an apparent intermediate with *P. paniculata*.

Phlox paniculata Linné

Page 21. [CONNECTICUT: Add Hartford[g] and Tolland[g] counties.]

P. 22. KENTUCKY: Add Rowan County. MISSOURI: Add Bollinger, Franklin, Gasconade, Hickory, Howell, Marion, Montgomery, Reynolds, Ripley, Texas, Vernon, Warren, and Wayne counties.

P. 23. NEW YORK: Add Columbia[g], Essex[g], and Schoharie[g] counties. OHIO: Add Warren County. PENNSYLVANIA: Add Bedford[f] County. [RHODE ISLAND: Escaped in Washington[g] County.] WEST VIRGINIA: Add Summers County.

CHANGES IN THE INDEX KEWENSIS LIST OF NAMES

As a result of the studies of the eastern Phloxes, a number of changes in the interpretations of published names made by the editors of the Index Kewensis are called for. The following is a complete list of these, in so far as eastern species are concerned:

ORIGINAL NAME	KEW INDEX INTERPRETATION	PRESENT INTERPRETATION
acuminata, Pursh	paniculata	paniculata
acutifolia, Sweet	paniculata ?	paniculata
alba, Moench	maculata	maculata
altissima, Moench	glaberrima	carolina, variety
americana, Hort.	paniculata	paniculata
amoena, *Sims*		
amplexicaulis, Rafin.	(Quid ?)	pilosa, variety
amplifolia, *Britton*		
argillacea, *Cl. & Fer.*		pilosa
aristata, Lodd.	subulata	nivalis
aristata, Michx.	pilosa	pilosa
atrocaulis ×, Hort.		paniculata
bifida, *Beck*		
bimaculata, Hort.	odorata	maculata
brevifolia, *Baum.*	(Quid ?)	paniculata
Bridgesii ×, Hort.		paniculata
Brittonii, *Small*		subulata, variety
Broughtoni ×, Hort.		paniculata
Brownii ×, Salm-Dyck		paniculata
Buckleyi, *Wherry*		(described in 1930)
Caldriana, Court.	(Quid ?)	carolina
canadensis, Sweet	divaricata	divaricata, variety
candida, Pers.	maculata	maculata
canescens, *Salm-Dyck*		paniculata
carnea, Sims	glaberrima	carolina
carolina, Linn.	ovata	carolina

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[11] Plantae Novae Hispaniae: 26. 1887.

carolina, Sims	glaberrima	carolina
carolina, Sweet	floridana	carolina
carolina, Walt.	maculata	glaberrima
caroliniana, Hill	ovata ?	carolina
clarkioides, *Poit.*		paniculata
Coldryana ×, Paxt.		carolina
cordata, Ell.	paniculata	paniculata
corymbosa, Hort.	paniculata	paniculata
crassifolia, Lodd.	reptans	stolonifera
cruenta, Curt.	(hybr. ?)	paniculata
cuspidata, Scheele	pilosa	drummondii
decussata, Lyon	paniculata	paniculata
detonsa, *Small*		pilosa, variety
disticha, Sabine	(Quid ?)	paniculata
divaricata, *Linn.*		
divergens, Wender	(Quid ?)	paniculata
Drummondii, *Hook.*		
elata, *Penny*		paniculata
excelsa, Penny	(Hybr. ?)	maculata
floridana, *Benth.*		
frondosa, Hort.	subulata	nivalis
fruticosa, Hort.	maculata ?	carolina
glaberrima, *Linn.*		
glomerata, *Nutt.*		divaricata
glutinosa, Buckl.	divaricata	divaricata × pilosa
Hentzii, Nutt.	subulata	nivalis
Heynholdii, Hort.	Drummondii ?	drummondii, variety
hybrida ×, Rafin.		(indeterminate)
Ingramiana ×, Hort.		paniculata
intermedia, *Lodd.*		paniculata
involucrata, Nutt.	(Quid ?)	amoena
involucrata, Wood	amoena	amoena
laeta ×, Penny		paniculata
Laphamii, *Clute*		divaricata, variety
latifolia, Michx.	ovata	ovata, variety
Leopoldiana ×, Paxt.		carolina × drummondii
Lighthipei, *Small*		amoena, variety
Listoniana, *Sweet*		carolina
longiflora, Sweet	maculata	maculata
macrophylla ×, Court.		paniculata
maculata, *Linn.*		
melampyrifolia, Salisb.	glaberrima	glaberrima, variety
missourica, Salm-Dyck	(Quid ?)	paniculata
montana, Rafin.		ovata
nitida, Pursh	glaberrima	carolina
nivalis, Lodd.	subulata	nivalis
Nuttalliana, Hort.	floridana	maculata
Nuttallii, Court.	floridana	maculata
obovata, Muhl.	reptans	stolonifera
odorata, *Sweet*		maculata, variety
Oldryana, Walp.	Coldryana	carolina
omniflora ×, Hort.		paniculata
ovata, *Linn.*		
paniculata, *Linn.*		
penduliflora, Sweet	maculata	maculata
philadelphica, Hort.	(Quid ?)	paniculata
pilosa, *Linn.*		
pilosa, Walt.	amoena	amoena
procumbens, Gray	amoena	amoena
procumbens ×, Lehm.		subulata × stolonifera
prostrata, Ait.	reptans	stolonifera
pulchella ×, Hort.		paniculata
pyramidalis, Sm.	maculata	maculata, variety

reflexa, Hort.	maculata	maculata
reptans, *Michx.*		stolonifera
revoluta, Aikin	glaberrima	carolina
rosea, Forbes	(Quid ?)	subulata × stolonifera
Rugelii, *Brand*		divaricata × amoena
scabra, Sweet	paniculata	paniculata
setacea, Linn.	subulata	subulata
Shepherdii ×, Penny		carolina
Sickmanni, Lehm.	paniculata	paniculata
Siebmanni, Benth.	paniculata	paniculata
Stellaria, *Gray*		bifida, variety
stolonifera, Sims	reptans	stolonifera
suaveolens, Ait.	maculata	maculata
subulata, *Linn.*		
suffruticosa, *Vent.*		carolina
suffruticosa, Willd.	glaberrima	carolina
tardiflora, Penny	maculata	maculata
tenuis, *E. Nelson*		
Thomsoni, *Court.*	(Quid ?)	paniculata
tigrina, *Wender*	(Quid ?)	paniculata
triflora, Michx.	glaberrima ?	carolina, variety
triflora, Sweet	ovata	carolina
undulata, Ait.	paniculata	paniculata
uniflora, Rafin.	(Quid ?)	(indeterminate)
verna ×, Forbes		subulata × stolonifera
vernalis, Salisb.	divaricata	divaricata
Vernoniana ×, Hort.		paniculata
villosissima, *Small*		pilosa
virginica, *Lodd.*		paniculata
Walteri, Chapm.	amoena	amoena, variety
Wheeleriana ×, Sweet		paniculata

The following corrections to literature citations in the Kew Index should also be made:

Phlox cordata. Ell. Sketch i. 244.
cruenta ed. II, ii, 322.
suaveolens ed. I, i. 206.
undulata ed. I, i. 205.

The present article is the eighth and last in this series on the eastern Phloxes. A complete list of the titles and references follows:

Picking out the Polemoniaceae. Bartonia 11: 1. 1929.
The Eastern Subulate-leaved Phloxes. 11: 4. 1929.
The Eastern Short-styled Phloxes. 12: 24. 1931.
The Eastern Long-styled Phloxes, Part 1. 13: 18. 1932.
The Eastern Long-styled Phloxes, Part 2. 14: 14. 1932.
The Eastern Veiny-leaved Phloxes. 15: 14. 1933.
A Variety of Phlox ovata from the Alabama Mountains. 16: 37. 1935.
Supplementary Notes on the Eastern Phloxes. 16: 39. 1935.

Reprints of all these have been made, and will be sent to any one desiring them as long as the supply lasts. If all are collected together, they will make a 120-page booklet. Similar though less detailed studies on the members of the genus in the central and western United States are in course of preparation.

A New Variety of Lycopus americanus Muhl.

Walter M. Benner

Several years ago when I undertook a study of the genus *Lycopus*, it was suggested to me by Mr. Bayard Long that I investigate the possibility of the occurrence of a variety of *L. americanus* Muhl. within our local area. Mr. Long had collected several numbers on the Coastal Plain which he felt were worthy of further study, but he was not prepared to state whether this material might be the basis for a new variety. Since that time, the writer has collected a number of specimens of the same form, and has had opportunity to make a series of field observations. Additional study of herbarium material from the herbaria at the Philadelphia Academy of Natural Sciences, the University of Pennsylvania, the New York Botanical Garden and the United States National Herbarium, as well as the private herbarium of Dr. Charles C. Deam, of Bluffton, Indiana, has led to the conclusion that a perfectly good undescribed variety of this species occurs on the Coastal Plain of the Middle Atlantic states, and also in the sand dune country of northern Indiana and northwestern Ohio. This is not an unusual type of distribution. There are numerous instances of plants occurring on the eastern Coastal Plain, and also on the sandy soil of the eastern North Central states in the region of the Great Lakes.

The plant is quite distinct from the typical species, and a new variety is therefore proposed which may be distinguished by the following contrast of characters:

Stem glabrous, or sometimes with short appressed dark pubescence; upper leaves attenuate, sinuate to sharply serrate .... *L. americanus*
Stem with abundant, long, white, loose spreading pubescence; upper leaves linear-attenuate, remotely serrate .... *var. Longii*

Lycopus americanus Muhl., var. **Longii** Benner, var. nov.

(Caulis pili longi, albi, laxe patentes, copiosi; folia superiora lineari-attenuata, remote serrata.)

Found in various moist situations such as swamps, swales, wet, open woods, and shores of streams mainly in sandy soil. . . . Long Island, New Jersey, Pennsylvania and Delaware. Also in northwestern Ohio and northern Illinois. Probably also to be looked for on the same geologic formation in northern Illinois.

The typical species also occurs within this range, and is nowhere entirely replaced by the variety.

The following are characteristic: New York: Suffolk Co.—East Hampton, L. I., *W. C. Ferguson*, October 16, 1919; littoral sand dunes, Amagansett, L. I., *N. Taylor*, Sept. 4–5, 1909; Nassau Co.—Long Beach, L. I., *E. P. Bicknell*, No. 7423, Aug. 26, 1926; sandy border of pond, Wantagh, L. I., *E. P. Bicknell*, Aug. 7, 1907. New Jersey: Mercer Co.—Bear Swamp, Lawrence Station, *E. B. Bartram*, Sept. 19, 1913; Gloucester Co.—sphagnous spot in meadow, s.w., South Westville, *Bayard Long*, Oct. 5, 1909. Pennsylvania: Bucks Co.—swale within 1 mile s., Morrisville, *Bayard Long*, No. 31458, Sept. 27, 1924; wet soil in gravel pits, Bristol, *W. M. Benner*, No. 3126, Aug. 4, 1927; swale by canal, near Edgely, *Bayard Long*, No. 29123, Aug. 28, 1923 (Type in Philadelphia Botanical Club Herbarium). DELAWARE: New Castle Co.—thicket, edge of swamp, 2 miles below State Road Station, *R. R. Dreisbach*, No. 4035, Aug. 29, 1925. OHIO: Pickaway Co.—wet soil in woods, Hayesville, *R. R. Dreisbach*, No. 2167, Aug. 11, 1922. INDIANA: Steuben Co.—low border of south side of Clear Lake, *C. C. Deam*, No. 20888; Laporte Co.—swamp on west side of Michigan City, *C. C. Deam*, No. 5255, Aug. 16, 1908; Porter Co.—in marsh just south of dunes, 2 miles east of Tremont, *C. C. Deam*, No. 39521, Aug. 8, 1923.

Lycopus rubellus Moench and its Varieties

WALTER M. BENNER

Of all the species of *Lycopus* occurring in eastern North America, the one which has presented the greatest difficulties to students is *Lycopus rubellus.* Although this specific name was proposed by Conrad Moench in his Supplementum ad Methodum Plantas, 146. 1802, the species was not recognized by American writers until much later. Prof. Asa Gray adopted the name for what he had previously described as *L. europaeus*, var. *integrifolius*,[1] in his Synoptical Flora of North America, vol. ii, Part I, 353. 1878, and this name made its first appearance in Gray's Manual, ed. VI. 408. 1889. Previous to the recognition of this species, and even much later in some cases, material rightfully coming under this species was variously classified under such well-known species as *L. virginicus* and *L. americanus.* As recently as 1883 Chapman[2] included it, or at least one of its varieties, under *L. sinuatus*, var. *intermedius.* As further evidence of the fact that this species was not so well understood in the past, and perhaps still is not properly understood by some, it is only necessary to refer to the material classified under *L. rubellus* in some of the well-known herbaria. Here one finds material rightly belonging to several other species, but in stages of development making it more or less difficult to identify, classified with the true *L. rubellus.* The point I wish to emphasize is that most of the difficult material is referred to this species which shows that the species has not been well understood. Possibly one of the main reasons for this is due to the fact that Moench gave a very generalized description as was the custom so common with the early botanical writers. They frequently did not have more than a single plant to study, and often they were not familiar with any other species of the same genus. Our current manuals, although recognizing it as a valid species, do not entirely clarify its characters. For example, in Gray's Manual, ed. VII. 709, we find this statement under *L. rubellus*: "Resembles No. 1 [L. virginicus L.], but has long slender calyx-teeth." It is my purpose to attempt to show that *L. rubellus* is a valid name for a well defined species, and also to clarify the characters of it and its varieties. To do this it is necessary to begin with Moench's original description, which follows:

Lycopus, rubellus, foliis oppositis lanceolatis aequaliter dentatis, subtus rubellis, petiolum versus integris, floribus axillaribus confertis sessilibus.

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[1] Gray's Manual, ed. V: 346. 1867.

[2] Flora of Southern United States, ed. 2. 1883.

> *Lycopus*, flore minimo albo, foliis purpureis acuminatis serratis, odore remisso. *Gronov. fl. Virg.* p. 5.
>
> Caulis bipedalis erectus, ramosus, tetragonus, angulis obtusis, pilis adpressis scabriusculus. Rami patentes oppositi. Folia acuta, rigidiuscula, glabra, supra virentia: infra rubella: suprema utrinque rubella. Flores ebracteati. Calyx pilosus scaber: laciniis acutis apice rubellis: lineam unam longus. Flores albi rubellive, extus hirti, calyce longiores. Stamina corolla breviora.
>
> h. H. Perennis.

The supposed native country of the plant is clearly indicated by the citation of the Flora Virginica. The citation is to a note in the second edition of this work published in 1762 following the only species of *Lycopus* mentioned there, *L. virginicus* (Linn. Spec. 21), and refers to Clayton 181. No notes on Clayton 181 could be found, whereupon a series of carefully identified recent specimens of the various species of *Lycopus* of eastern North America were sent to Dr. A. B. Rendle, of the British Museum of Natural History, together with a request that these specimens be compared with the Clayton plant. The reply to this request signed by George Taylor is, in part, as follows:

"I can find no trace of Clayton 181 in this Herbarium and it is significant to note that in our copy of the Flora Virginica the No. 181 has been changed by some hand to No. 188. We have this specimen No. 188 determined as Lycopus virginicus L. and I can find no reference to it in the Flora Virginica. I have compared your specimens with this Clayton specimen No. 188 and I find your No. 4 (Lycopus virginicus L.—Bristol, Pa.) to be an exact match in every respect. The leaf shapes are identical and both specimens have dried in the same manner—purplish on the under surface of the leaf. Clayton's specimen consists of a flowering shoot with no indication of the basal and underground characters."

Moench states the occurrence of the plant which he described merely as "h. H." (habitat in Horto), which means that he described a plant growing out-of-doors in the Garden at Marburg. So far as is known, no material was preserved by Moench. An inquiry sent to Moench's present-day successor at Marburg, Germany, Dr. P. Claussen, brought the reply that, so far as he has been able to discover, there is no Moench herbarium material in existence anywhere.

The information from the British Museum of Natural History suggests that Moench quoted as a synonym for his new species the previously described *L. virginicus*. It does not follow necessarily that the plant he was describing at the time was also *L. virginicus*. Errors in synonymy are frequent in descriptions of the kind he made. Much of his original description is based on generalized key characters and might be equally applicable to more than one species of *Lycopus*. However, he does say that the leaves are petioled, the flowers longer than the calyx, and the calyx-lobes acute. The length of the corolla would eliminate *L. americanus* Muhl. and the shape of the calyx-lobes would eliminate *L. virginicus* L. and *L. uniflorus* Michx. If the plant in the Garden at Marburg originated in eastern North America, as the foregoing facts suggest, then we can very easily, by the process of elimination, determine that the plant described by Moench is actually the *L. rubellus* of our current manuals. It is a perfectly good species closely allied to *L. sessilifolius* Gray, but it has petioled leaves and is a plant of much wider distribution. A treatment of the species and its geographical varieties follows:

Leaves 1–4 cm. wide, elliptic or ovate elliptic, acuminate.
  Leaves sharply serrate or dentate-serrate.
    Stem and calyx glabrous or nearly so; calyx lobes straight, about as long as tube. *L. rubellus*
    Stem and calyx copiously pubescent; calyx-lobes recurved, longer than tube; floral envelope glandular punctate .... *var. velutinus*
  Leaves minutely and remotely serrate; stem and lower surface of leaves minutely pubescent; calyx lobes more or less recurved .... *var. arkansanus*
Leaves 1 cm. or less wide, lanceolate, remotely serrate with long acuminate tip; stem and calyx glabrous or nearly so .... *var. lanceolatus*

Lycopus rubellus Moench., Meth. Suppl. 146. 1802.
(*Lycopus europaeus* var. *integrifolius* A. Gray. Man. ed. V: 346. 1867.)

Stem reddish, much more so than the leaves, minutely puberulent or glabrous, obtusely four-angled, stoloniferous but not tuberiferous, 5–12 dm. high; leaves elliptic or ovate-elliptic, 3–15 cm. long, sharply serrate or dentate-serrate, manifestly petioled, acuminate at apex; bracts minute, acute or acuminate; corolla 3.5–4 mm. long, twice as long as calyx; stamens shorter than or equalling the corolla; style two-cleft, much exerted; calyx 2.5 mm. long, lobes straight, triangular-subulate, not rigid-pointed; nutlets with a papillose apex, much shorter than the calyx.

A plant found in various situations in damp to wet soil. Ranges from New Hampshire and Massachusetts southward to Florida and Louisiana and westward to the Mississippi Valley. Most of the material seen from west of the Mississippi River merges into variety No. 3. In the southeastern Coastal Plain variety No. 1 occurs with but does not entirely replace the typical species. In the lower Mississippi Valley variety No. 2 is found but how nearly it replaces the typical species there has not been so well determined because of the scarcity of herbarium material from this particular area. The varieties proposed may be summarized as follows:

1. **Lycopus rubellus** Moench, var. **lanceolatus** Benner nov. var.

This variety occurs in the Coastal Plain of the southeastern United States. It is a variety with long lanceolate leaves which are remotely serrate and have a long acuminate tip.

(Folia 1 cm. vel minus lata, lanceolata, remote serrata, acuminata; caulis calyxque glabratus.)

The early collections of this variety by Baldwin, Nuttall, and others, we find variously labelled as *L. praealtus* Nutt. (mss. name), *L. attenuatus* (ined.) and *L. angustifolius* Elliott. Since the Nuttall names are not validly published it is necessary to consider here only the *L. angustifolius* Elliott., Bot. S. C. & Ga. I: 26. 1821. Included in Elliott's description we find reference to the rigid calyx-segments and another reference to the "leaves remotely serrate, the serratures growing deeper on the lower leaves." He also quotes as a possible synonym *L. europaeus* Walter (not L.) Flora Caroliniana 64, 1788. Here Walter says "foliis sinuato-serratis." All this suggests *L. americanus* Muhl. A few years ago Dr. Edgar T. Wherry visited the Charleston Museum at Charleston, S. C., and volunteered to bring back for the writer a photograph of Elliott's type specimen of *L. angustifolius* but failed to discover it in the collection there. The name *angustifolius* would describe this variety very well, but apparently Elliott's name is a synonym for another species, and there is also an *L. angustifolius* Nuttall, Gen. I: 15. 1818 (without characters) which is considered as an extreme form of *L. americanus* by House.[3] It is therefore desirable to give this variety another name and *lanceolatus* is accordingly proposed. Southern Virginia and North Carolina to Georgia, Florida and Alabama.

There are a number of specimens in existence which are intermediate between this and the typical species. The following characteristic material was seen. VIRGINIA: Princess Anne Co.—sandy bog, inner dunes, Cape Henry, *E. P. Killip*, No. 6791, Sept. 1, 1919. NORTH CAROLINA: (no locality or date) *McCarthy*, U. S. Dept. of Agriculture label. GEORGIA: (No locality or date), *Nuttall*. FLORIDA: Jefferson Co.—Lloyds, G. V. Nash, No. 2507, Sept. 1, 1895 (TYPE in United States National Herbarium); Lee Co.—Fort Myers, cypress swamp, *P. C. Standley*, No. 12,576, Feb. 2, 1916. ALABAMA: Mobile Co.—ditches, *C. Mohr*; Baldwin Co.—ditches common, *Chas. Mohr.*, Oct. 4, 1894.

2. **Lycopus rubellus** Moench. var. **velutinus** (Rydb.) Benner nov. comb.
(*L. velutinus* Rydb.; Small Fl. S. E. U. S. 1049. 1903.)

This is a variety with copiously pubescent stem and calyx; glandular-punctate corolla and calyx-lobes more or less recurved. It is found only on the Coastal Plain in the lower Mississippi Valley. The following specimens were seen: TEXAS: Smith Co.—Tyler, *J. E. Reverchon*, No. 2120, Sept. 20, 1900 (Type of *L. velutinus* Rydb.). MISSISSIPPI: Harrison Co.—Biloxi, *S. M. Tracy*, No. 3117, Sept. 15, 1896. LOUISIANA: East Baton Rouge Parish, *C. A. Brown*, No. 1384, Oct. 16, 1927.

The first two are in the Herbarium of the New York Botanical Garden and the third is in the Herbarium of Louisiana State University.

3. **Lycopus rubellus** Moench. var. **arkansanus** (Fresenius) Benner nov. comb.
(*L. arkansanus* Fresenius, in Flora XXV: 310–311. 1842.)

According to Dr. G. Fresenius this plant was first observed and collected at Hot Springs, Arkansas, by Dr. Engelmann.

Stem finely pubescent: leaves minutely and remotely serrate, or the upper ones almost entire margined, finely pubescent below; calyx-teeth somewhat less pointed. Missouri, Arkansas and northeastern Texas.

Specimens seen from the following states and counties: MISSOURI: Barry, Butler, Dunklin, Green McDonald, Polk, St. Louis, Shannon, Taney; ARKANSAS: Craighead, Pike, Pulaski, Salem; TEXAS: Anderson, Bowie.

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[3] Annotated List of Ferns and Flowering Plants of New York State, 608. 1924.

Lilaeopsis chinensis in Southern New Jersey

JOHN M. FOGG, JR.

The interesting little umbelliferous plant, *Lilaeopsis chinensis* (L.) Kuntze (*L. lineata* (Michx.) Greene),[1] has long been considered one of the rarest members of the flora of the Philadelphia local area. Restricted in its occurrence to salt marshes and brackish tidal shores, this species has been known from but three, possibly only two, localities in southern New Jersey and one in New Castle County, Delaware.

Lilaeopsis was apparently first discovered growing in New Jersey by Thomas Nuttall. In his "Genera of North American Plants," where the species appears as *Crantzia lineata,* Nuttall mentions it as "abundant near Egg Harbour, New Jersey, in a salt marsh."[2] This record is substantiated by a specimen, collected by him, preserved in the Philadelphia Academy of Natural Sciences. Unfortunately the label bears no date, but the plant must have been collected between 1809, when Nuttall first came to Philadelphia, and 1818, the date of publication of the "Genera." Dr. Witmer Stone has called attention to the fact[3] that Nuttall's material was certainly not collected near the present-day settlement of Egg Harbor City, Atlantic County, which is some miles inland from the salt marshes, but rather from some locality, probably Beesley's Point, on Great Egg Harbor Bay.

For nearly a hundred years *Lilaeopsis* appears to have escaped the attention of botanists in southern New Jersey, although in the meantime its range was being extended to the north and northeast. It was not until 1906 that a second station was discovered for the species within the limits of the Philadelphia local area. On September 8 of that year Mr. K. K. Mackenzie found it growing halfway between Mantoloking and Chadwick, in Ocean County. *Lilaeopsis* there occurred as "a large patch" on the "sandy shore of Barnegat Bay within a few yards of the railroad" (Mackenzie No. 2391).

Almost three years later, August 30, 1909, Dr. Stone and Mr. S. S. Van Pelt discovered another locality. This time the plant was detected near Palermo, Cape May County, where it occupied the sandy border of a fresh spring near the edge of the salt marsh. Due to the ambiguity attending Nuttall's early locality, and since no subsequent collection has established the occurrence of *Lilaeopsis* along Great Egg Harbor Bay, Stone inclines to the view[4] that he and Van Pelt may well have rediscovered the original New Jersey station. If this interpretation be accepted, then the known occurrence of *Lilaeopsis chinensis* in southern

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[1] See Fernald, Rhodora, xxvi, 93 (1924) and Hill, Journ. Linnean Soc., xlvii, 525 (1927).

[2] Nuttall, Gen. **1**: 178 (1818).

[3] Stone, BARTONIA **1**: 21 (1908).

[4] Stone, *l.c.*

New Jersey has come to rest upon two localities, more than sixty miles apart, situated within the narrow maritime strip along the Atlantic coast.

The Delaware station is represented in the Philadelphia Botanical Club by a sheet collected by Dr. F. W. Pennell on August 3, 1916, at Augustine Beach, New Castle County (Pennell, No. 7779). In contrast to its previously known habitats, the plant was here growing in the mud along the tidal shores of the Delaware River, associated with *Scirpus americanus* Pers.

For several years the writer has devoted considerable attention in the field to the distribution of plants along the New Jersey shore of the Delaware Bay and Delaware River. During the last two seasons (1933 and 1934) this interest has been focussed mainly upon that portion of the shore-line lying within the boundaries of Salem County, *i.e.*, a strip of about 40 miles extending from the mouth of Oldman's Creek to the mouth of Stow Creek.

One of the most significant results arising from this survey has been the discovery of the existence in Salem County of a large number of maritime species not previously reported as occurring along the Delaware drainage north of the Cape May peninsula. This element of the vegetation includes plants which grow characteristically on the salt marshes and sand beaches of the Atlantic coast of New Jersey from Sandy Hook to Cape May Point, but which are now seen to follow up the Delaware Bay and Delaware River for a distance of many miles. The total number of such species at present known from Salem County is 56, of which only 8 were recorded by Stone[1] as existing at any point along the bay or river north of Dennisville, Cape May County; of these 8 species Stone attributes but 5 to Salem County, so that the present study has resulted in the addition of 51 maritime species to the known flora of the county. As nearly every trip to the area yields additional finds of this nature it is doubtful whether the list can be regarded as complete until practically every foot of this 40 mile shore line, with its extensive tidal marshes and innumerable beaches, has been explored. Since it is proposed to utilize this subject as the basis for a future report, a detailed consideration of it is unnecessary at this time.

In Cumberland County, which lies immediately to the south of Salem County, Mr. Bayard Long has been pursuing a similar investigation, with the result that he has so far established the presence within his limits of an even larger number of maritime species than is known from north of Stowe Creek, which forms the boundary line between the two counties. This is, of course, to be expected, since a considerable portion of the shore line of Cumberland County lies below the mouth of the Delaware River and is therefore washed by the more saline waters of the Bay. This maritime element, as at present understood by Long, finds expression in a block of some 80 species, the overwhelming majority of which have never been reported as occurring north of Dennisville. This study likewise, it is hoped, will furnish matter for a more lengthy elaboration.

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[1] Stone, Plants of Southern N. J. (1910).

During the course of my own work it was found helpful to prepare a complete list of the maritime plants which are known to occur along the outer sea coast of New Jersey and which might therefore conceivably be expected to follow up the Delaware drainage as far as Salem County. *Lilaeopsis chinensis* was included in this enumeration rather for the sake of completeness than because any real hope was entertained of finding it within the county. Its status in the list was regarded as comparable to that of *Triglochin maritima* L., collected only at Point Pleasant, Ocean County, or *Ranunculus Cymbalaria* Pursh, known from but three or four widely scattered localities along the coast between Monmouth and Atlantic Counties.

On October 31, 1933, Mr. Long and I were exploring the shore of the Delaware River near Elsinboro Point, Salem County. The morning had been productive of several interesting additions to the maritime list, including *Tripsacum dactyloides* L., *Panicum amarum* Ell. and *Cakile edentula* (Bigel.) Hook. After lunch we started to work along the edge of the shore, which was here a firm bank of mud, save where the action of the tide had carved it away or covered it over with sand. The bank was in most places occupied by a dense stand of *Scirpus americanus,* whose strong system of rootstocks acted as a binder holding the tidal mud in place. Our attention was attracted by a green mat of vegetation growing below high-water mark at the base of the *Scirpus* stems and we leaned over to examine it: to our keen surprise and delight the surface of the mud was covered by a solid turf of *Lilaeopsis*!

Further search revealed the fact that this was no mere isolated colony. We spent the remainder of the afternoon exploring as much of the shore south of Elsinboro Point as a rising tide would permit, and at practically every point over a distance of half a mile where conditions were favorable the plant was present and in many cases dominant. It grew invariably on the firm mud at the base of the *Scirpus* culms and was strictly confined to the belt between tide levels, being completely submerged at time of high water. Its mode of occurrence here reminded us strongly of the conditions under which we had seen it growing north of New Jersey, notably along the Bass River near Yarmouth on Cape Cod, Massachusetts.

Feeling that the wide-spread existence of *Lilaeopsis* near Elsinboro Point must be indicative of its presence elsewhere along the shores of the Delaware River, I selected various localities for exploration during the season of 1934. It is not always easy to reach the river shore of Salem County without the aid of a boat, for in many places, especially toward the south end of the county, broad tracts of marshland dissected by frequent creeks and drainage ditches render it extremely difficult if not impossible to reach the water front from the land side. The finding of suitable localities, therefore, frequently entails close study of maps and much arduous exploration.

The first region to be visited in 1934 was a strip of shore-line between Black Ditch and the mouth of Alloway's Creek, about 3¾ miles west of Hancock's Bridge. Here, on May 21, I found *Lilaeopsis* growing freely on the tidal mud, once more at the base of *Scirpus americanus* and below the high tide level. The discovery of this station extended the range of the species about 2½ miles south of Elsinboro Point.

On June 22 I selected Finn's Point, a stretch of mud and sand beach about 5 miles north of Elsinboro Point. Here again, and under the same conditions as in the two previous cases, the plant was abundant.

Believing now that there could scarcely be any considerable section of the shore-line from which *Lilaeopsis* was lacking, I next attempted to see how far south in Salem County the species could be found. Accordingly, on August 30, I went to Bayside at the mouth of Stow Creek, which forms the extreme southern boundary of the county. Here the river shore is very marshy and a boat was required to work northward from Bayside. The entire absence of *Scirpus americanus* appeared, at first sight, to present an additional obstacle; the shore being fringed by a solid growth of *Spartina alterniflora* Lois., var. *pilosa* (Merrill) Fernald. Nevertheless, by procuring a small rowboat and looking about at the bases of the *Spartina* stems, I was soon rewarded by the sight of the familiar green turf. *Lilaeopsis* was growing profusely here, 14 miles southeast of the Elsinboro Point station.

The next concern was to establish its northern limit. To this end I explored, on October 3, the region below Pennsville, about 5 miles north of the Finn's Point locality. The shore at this point is mostly firm sandy beach, a condition apparently unfavorable to the occurrence of *Lilaeopsis*, and although several other interesting discoveries were made (notably a fine second station for *Panicum amarum*) the plant eluded detection until late in the day when I found it just below Kelly's Point, about 2 miles southwest of Pennsville. At this spot there was just enough of a mud beach, with its growth of *Scirpus*, to support a rather thin turf of the umbellifer.

From my present knowledge of the nature of the coast north of Pennsville—a shore characterized by flat sandy beaches—I should be fairly willing to hazard a guess that the Kelly's Point locality may well represent, along the New Jersey side of the Delaware River, the northern limit of the occurrence of *Lilaeopsis chinensis*, although it is always possible that an isolated mud bank, with its binding system of *Scirpus* or *Spartina* rhizomes, may harbor a chance colony.

During October and November, 1934, several additional Salem County stations were discovered, but as they all lie within the limits set forth above, and as they will be included in the complete list of New Jersey localities given below, no further reference to them need be made at this point.

Meanwhile Long had been eager to see whether he could locate the plant in Cumberland County and we had gone, on September 6, to the region south of

Bayside. The first point along the shore at which we landed presented a steep mud bank held by a strong growth of *Spartina* and, as might be expected, the surface of the ground was filled over solidly with *Lilaeopsis*. Indeed, at hardly any spot along the two miles that we explored, *i.e.*, south to the mouth of Fishing Creek, was the plant absent. Its habitat here was similar to that where I had found it just north of Bayside.

Long has since extended the range of the species southeast to Sea Breeze, about 6 miles below Bayside, but has so far been unable to locate it at any point farther down the river. The plant, then, is known at present to occur over a distance which, if measured in a straight line is nearly 25 miles, but which, if expressed in terms of actual curving shore-line, is about 32 miles.

In another article in this issue Miss Esther L. Larsen describes her experiences with *Lilaeopsis* on the opposite or Delaware side of the river. Her results need be referred to here only insofar as they indicate a distribution on the west shore of the Delaware River which closely parallels that just described for the New Jersey coast.

It is probably too soon to determine precisely what factors control the distribution of *Lilaeopsis* along the Delaware drainage. Its occurrence is apparently conditioned largely by the presence of a firm and relatively permanent mud shelf between tide levels; at only one or two spots has it been found growing on pure sand. Since the necessary mud banks appear to owe their continued existence to the binding action of *Spartina* or *Scirpus*, the answer to the question as to what limits the occurrence of the umbellifer may have primarily to be sought in terms of what controls the presence of the grass or the sedge. In either case one turns ultimately to the part which salinity may play in influencing, directly or indirectly, the range of *Lilaeopsis*.

Dr. Thurlow C. Nelson, Professor of Zoology at Rutgers University and Biologist of the New Jersey Oyster Investigation Laboratory, informs me that, while an extended series of salinity figures has been accumulated for the Delaware Bay and River, these data have not yet been published. It is therefore hardly possible at present to attempt to explain the occurrence of *Lilaeopsis* on a quantitative basis. However, when the facts of its distribution are reviewed, it is seen that the plant's southern limit is well above the open waters of the bay, where it would be exposed to rather high salt concentration, and that it extends some 30 miles upstream to a point still within the brackish influence of high tides. Thus it would appear that, in the Delaware drainage at least, this species belongs to that group of estuarine plants which flourish in a kind of brackish tension zone where the water is neither salty nor fresh.

Following is a complete list of the stations, arranged in order from north to south, at which *Lilaeopsis chinensis* has been collected along the New Jersey shore of the Delaware River. Stations 1 to 12 are in Salem County, while stations 13 to 15 are in Cumberland County. The gap of about 10 miles, in a straight line, between stations 10 and 11 represents an area very difficult of access from which no collecting has as yet been done. Specimens of the numbers cited below have been deposited in the herbaria of the Philadelphia Botanical Club and the University of Pennsylvania.

1. One half mile southwest of Kelly's Point (about 2 miles southwest of Pennsville), October 3, 1934: *Fogg* No. 7567, *Adams* No. 1688.
2. Just south of Finn's Point (south of Fort Mott), June 22, 1934: *Fogg* No. 7002.
3. Two miles southwest of Harrisonville (near mouth of Mill Creek), October 29, 1934: *Fogg* No. 7853, *Adams* No. 1768.
4. Two miles south-southwest of Harrisonville (near mouth of Boll's Creek), November 5, 1934: *Fogg* No. 7891.
5. Elsinboro Point (about 3¾ miles southwest of Salem), October 31, 1933: *Long* No. 42495, *Fogg* No. 6289.
6. Elsinboro Point (about ¼ mile south of station 5), October 31, 1933: *Fogg* No. 6300.
7. Mouth of Straight Ditch (about 3¾ miles west-northwest of Hancock's Bridge), October 18, 1934: *Fogg* No. 7760.
8. Between Straight Ditch and Black Ditch (about ½ mile south of station 7), October 18, 1934: *Fogg* No. 7748.
9. Below mouth of Black Ditch (about 3¾ miles west of Hancock's Bridge and ½ mile south of station 8), May 21, 1934: *Fogg* No. 6554; October 15, 1934: *Fogg* No. 7723.
10. Below mouth of Alloway's Creek (about 3¾ miles west-southwest of Hancock's Bridge and 1 mile south of station 9), October 23, 1934: *Fogg* No. 7820.
11. Oyster Cove (about ½ mile northwest of the mouth of Stow Creek), August 30, 1934: *Fogg* No. 7435.
12. Bayside (small island in Delaware River at mouth of Stow Creek), September 6, 1934: *Fogg* No. 7479.
13. Near mouth of Jacob's Creek (about ¾ mile south-southeast of Bayside), September 6, 1934: *Long* No. 44463.
14. Near mouth of Fishing Creek (about 1¼ miles south-southeast of station 14), September 6, 1934: *Long* No. 44465.
15. North-northwest of Sea Breeze, October 28, 1934: *Long* Nos. 45201 & 45209.

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Distribution of Lilaeopsis chinensis in Delaware

ESTHER L. LARSEN

Until recently *Lilaeopsis chinensis* (L.) Kuntze was considered a rare element in the flora of Delaware. The plant was first collected in Delaware at Augustine Beach, August 3, 1916, by Dr. F. W. Pennell, who deposited a specimen in the herbarium of the Philadelphia Botanical Club. This remained the only record of the occurrence of the species in the state until the summer of 1929, when the plant was collected by Robert R. Tatnall at Port Penn, one mile north of Augustine Beach. A number of new stations were discovered by the writer in 1934 which establish the range of the species. It is strange that early botanists, who frequently collected along the shore should have missed this plant and even more surprising that *Scirpus americanus* Pers., a plant with which *Lilaeopsis chinensis* is commonly associated, is so poorly represented in collections from Delaware.

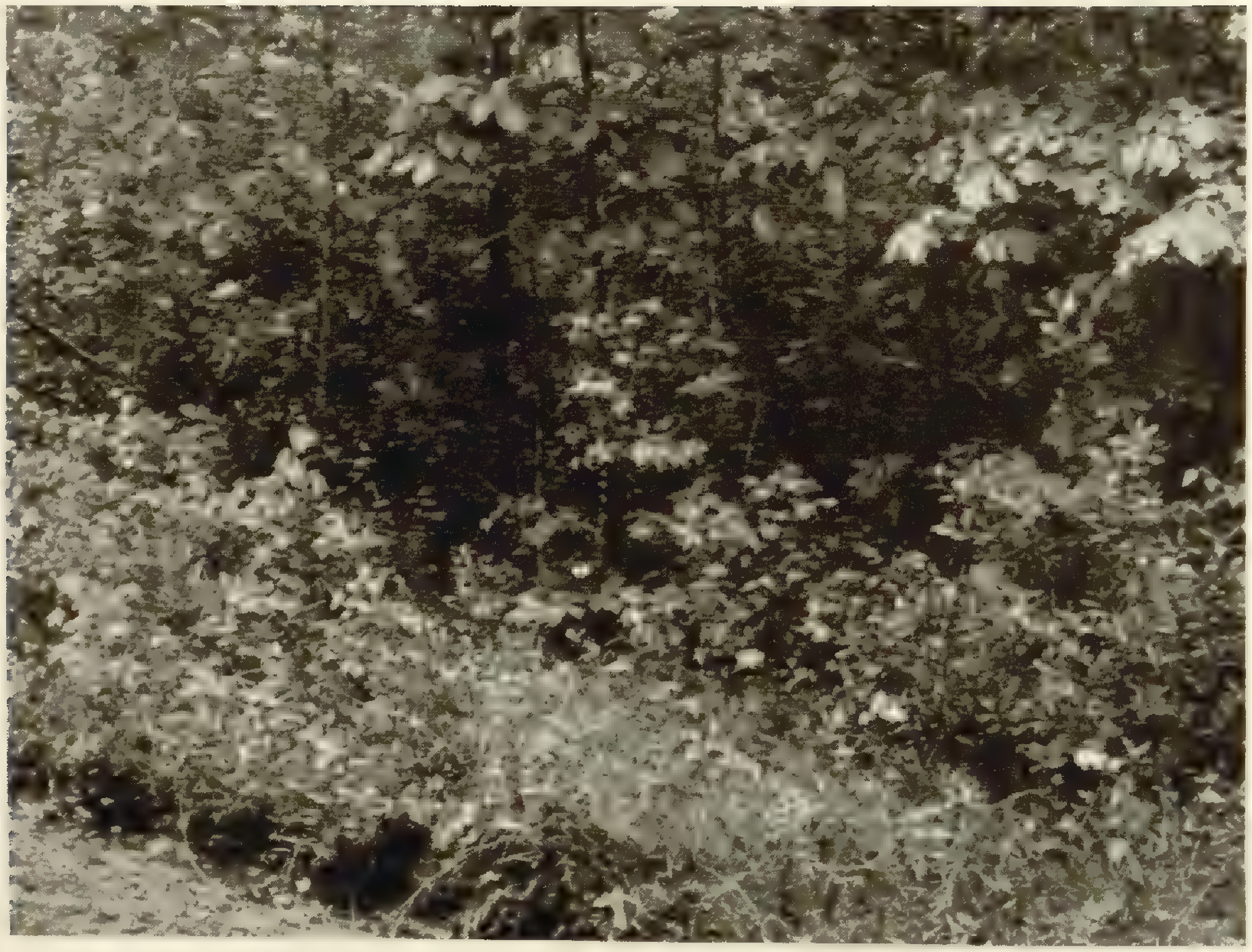

FIG. 1. *Phlox glaberrima* Linné at its presumable type locality in Chesterfield County, Virginia.

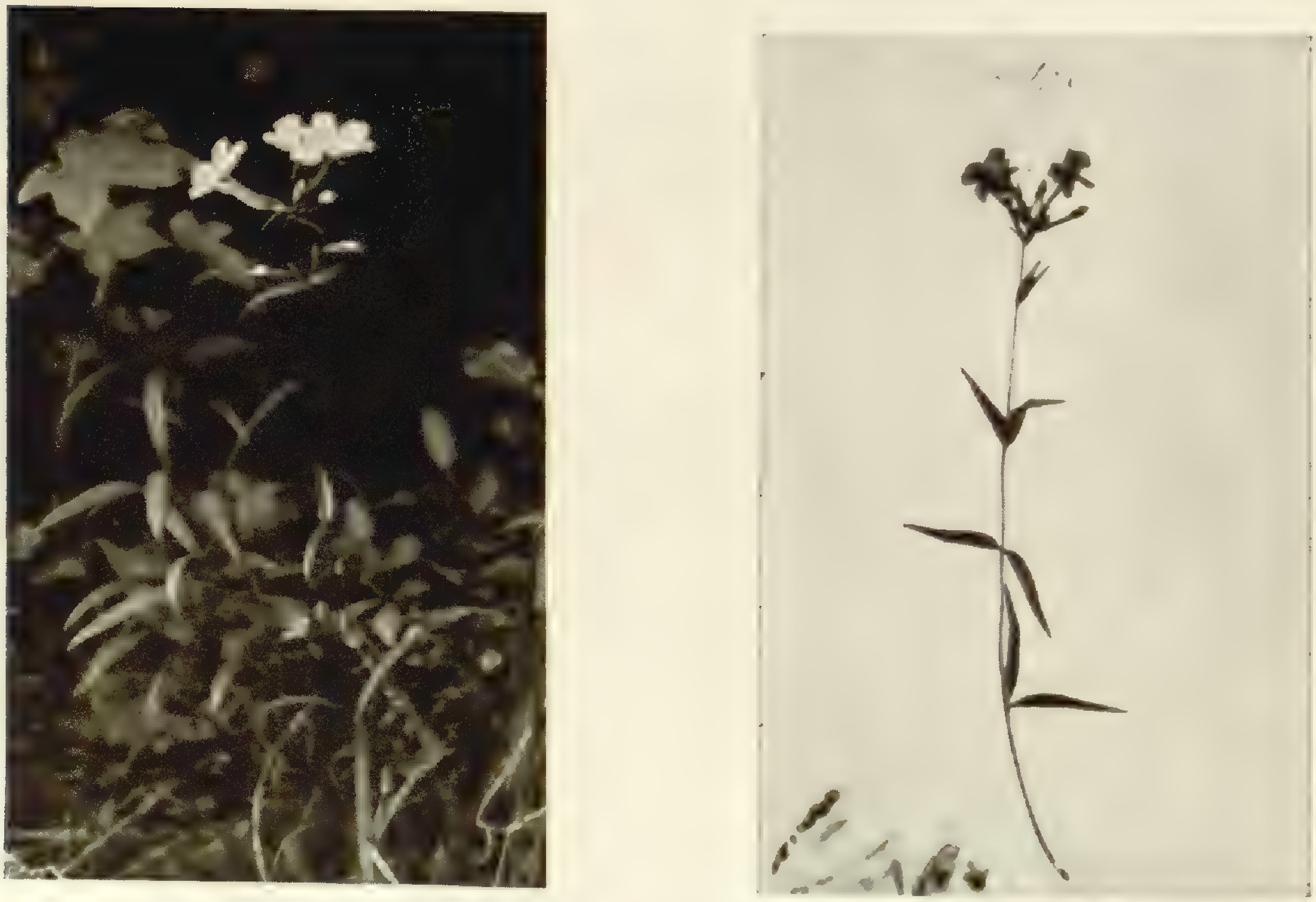

FIG. 2. Same, slender plant.

FIG. 3. The type specimen.

Showing the close similarity between them.

Prior to 1933, the herbarium of the Academy of Natural Sciences of Philadelphia contained only two specimens of *Scirpus americanus* collected in Delaware. The state was not represented by specimens in the herbarium of the Philadelphia Botanical Club.

Spartina alterniflora Lois., var. *pilosa* (Merrill) Fern., another plant with which *Lilaeopsis chinensis* is associated, is also inadequately represented in collections from the state. Both of these plants are widely distributed in Delaware. They follow the tidal streams which ramify the marshes. *Lilaeopsis chinensis,* on the other hand, is closely confined to the lower shores of the Delaware River and the upper shores of Delaware Bay.

Lilaeopsis chinensis does not extend inland but remains on the shore of the Delaware where its physiological requirements seem best satisfied. On the shore, the colonies form dense mats which rarely extend more than two or three yards inland from the edge of vegetation. The species extends up the river to Hamburg Cove, where it was collected at a point four miles south of Newcastle, and goes southward along the shore for approximately thirty miles to a point about one and one-half miles south of Fraland Beach. The plant has been collected at a number of intermediate points, and, within this range, it appears adapted to the existing conditions. These conditions vary considerably. At Delaware City and Pea Patch Island, *Lilaeopsis* formed dense turf-like colonies on tidal mud beneath *Scirpus americanus. Scirpus validus* Vahl was also present in the association. At Augustine Beach, growing on tidal mud, *Scirpus americanus* appeared in a pure stand above the *Lilaeopsis* turf.

In the upper part of the range, *Lilaeopsis chinensis* grows best where the tidal mud is relatively firm and where it maintains a fairly uniform level. *Lilaeopsis* does not grow in deep, shifting tidal mud nor in pure sand. The northernmost colony at Hamburg Cove, which is probably the northern limit of distribution, was growing on a mixture of sand and mud. Instead of forming a heavy turf, the colony was made up of a series of plants borne on scattered stolons. A short distance southward, soil and tidal conditions were more favorable and the colonies formed turf-like stands. Along the northern shore of Delaware Bay, *Scirpus americanus* is less conspicuous and *Spartina alterniflora,* var. *pilosa* forms a pure stand above colonies of *Lilaeopsis chinensis.* A characteristic portion of such an association is shown in Plate 4, figure 2. Here the roots of the two species were closely matted and grew not in tidal mud but in peaty material washed by the tide. Such colonies were formed at a point one-fourth mile north of Collins Beach and at Fraland Beach. The southernmost colony, one and one-half miles below Fraland Beach, was similar to those just described but formed a thinner turf. The area, in which the southernmost colony of *Lilaeopsis* was found, is well illustrated in Plate 4, figure 1, which shows the irregular peaty banks covered with a dense stand of *Spartina alterniflora* var. *pilosa.* The shore of Delaware Bay below this point is badly cut by waves and is characterized by perpendicular banks of peat four to six feet in height which drop abruptly to a shifting, sandy tidal beach. Unfavorable shore conditions, together with increased salinity, appear to prevent colonies of *Lilaeopsis chinensis* from developing further south.

A careful study of the lower shores of the Delaware River and the upper shores of Delaware Bay has led to the conclusion that *Lilaeopsis chinensis* is a common element of the flora within the limits of its range. The range of the species, as previously stated, extends along the shore from Hamburg Cove to a point one and one-half miles south of Fraland Beach, a distance not exceeding thirty miles. Within this range, under favorable conditions, colonies were found forming a characteristic part of the vegetation along the shore.

Because of the fact that the distribution of *Lilaeopsis chinensis* in Delaware is not generally known to botanists, a complete list of the stations now reported is given in geographical sequence from north to south as follows:

Shore of Delaware River, Hamburg Cove, 4 miles south of Newcastle, Dec. 5, 1934: *Larsen* 869.

W. side of Pea Patch Island, opposite Delaware City, July 2, 1934: *Larsen* 595.

N. E. side of Pea Patch Island, July 20, 1934: *Larsen* 692.

Coal Wharf, Delaware City, July 18, 1934: *Larsen* 630.

Port Penn, at village pier, in tidal mud of Delaware Bay, July 4, 1929: *Tatnall* 416.

Port Penn, at village pier, in tidal mud of Delaware Bay, August 22, 1929: *Tatnall.*

Mud of *Scirpus americanus* clumps, Augustine Beach, tide water of Delaware Bay, August 3, 1916: *Pennell* 7779.

Augustine Beach, tidal mud of Delaware River, ½ mile below hotel, June 23, 1932: *Tatnall* 1437a.

Augustine Beach, June 28, 1934: *Larsen* 564.

¼ mile N. of Collins Beach, December 2, 1934: *Larsen* 867.

Fraland Beach, July 15, 1934: *Larsen* 628.

1½ miles south of Fraland Beach, Sept. 10, 1934: *Larsen* 836.

A complete set of specimens collected by the writer has been deposited in the herbarium of the University of Pennsylvania. Duplicates have been distributed to the Gray Herbarium of Harvard University, Cambridge, Massachusetts, the herbarium of the Missouri Botanical Garden, St. Louis, Missouri, and to the herbarium of the Academy of Natural Sciences, Philadelphia, Pennsylvania.

BOTANY DEPARTMENT,
UNIVERSITY OF PENNSYLVANIA.

T. Chalkley Palmer

FRANK J. KEELEY

On February 3, 1934, the old Springfield Friends Burial Ground became the last resting place of one whose parting a few days previously left a void in the life of his friends that can never be filled.

Born on the outskirts of Media, Pennsylvania, Thomas Chalkley Palmer spent most of his seventy-three years in that vicinity and was prominently identified with the business and scientific development of Delaware County. After graduating from Haverford College in 1882 and studying chemistry both at the Philadelphia College of Pharmacy and in the laboratory of Henry Trimble, he became the first chemist employed by the Sharpless Dyewood Extract Co. of Chester. He later became Manager and a Director in its successor, the American Dyewood Co., from which he retired after holding this position for twenty years. In 1884 he was married to Hannah Jane Walter and had two sons, Walter and Lewis, who survive him. He was a Director of the Poor of Delaware County, Vice President and Director of the First National Bank of Media and a Director of the Delaware County National Bank of Chester. So much did he feel the responsibility of these positions that it was almost impossible to induce him to take even a week's vacation during recent years when the banks required particularly careful management.

His boyhood interest in nature was encouraged by his father, Lewis Palmer, a mineralogist and botanist, in whose company he spent his spare time collecting plants and minerals. In later life his greatest interest centered in such organisms as required microscopical investigation; but he had a wide knowledge of nature in general which qualified him as an ideal leader for the scientific excursions that were his chief recreation. He seemed to be acquainted with every rare plant in Pennsylvania, to know every log especially productive of Myxomycetes, as well as unusual localities for local minerals, so that he became the guide and mentor of many who acquired from him most of their nature lore.

While he had a wide circle of friends it was only the few who were favored with close intimacy who could fully appreciate his ability in this direction. He had a keen eye for the right environment even when it presented itself unexpectedly. We were walking along a valley one day when he remarked that yellow cypripediums should grow in such a place as the adjoining hillside. On climbing it we soon caught sight of a single specimen and shortly afterward nearly a dozen were in sight at once. On those occasions when he was definitely looking for a certain plant he had a way of "setting his eye" as he called it, after which he rarely failed to find what he was looking for. Many years ago he decided that *Ophioglossum* ought not to be as uncommon as it was supposed to be in Delaware County and undertook to hunt for it. Selecting suitable locations and "setting his eye," he soon discovered several new stations for it. Similarly I have been with him when he found new locations for *Asplenium pinnatifidum, A. ebenoides,* and *Lygodium* in eastern Pennsylvania. Among the recollections of an almost lifelong friendship I remember none more striking than the following. We had climbed a rocky hill on the Maine coast and had sat down to rest. After enjoying the view for a few moments I turned to find him examining some dried sticks caught in a crevice of the rocks. "Surely you are not looking for Myxos on a bare, dry hilltop like this," I remarked. To which he replied, "No, I'm not looking for them; I'm finding them," and handed me a twig containing sporangia of *Physarum.*

While the study of nature out-of-doors chiefly appealed to him, he was equally proficient in preparing and investigating microscopical specimens, not merely morphologically but with respect to life history and vital functions. At a time when the vegetable nature of diatoms was still disputed, his demonstration that they emanated oxygen when exposed to light was a very neat one. His observation of the presence of raphes at the ends of frustules of *Eunotia* served to account for the peculiar movements of some species of this genus. Most important of all was his discovery of the true structure of diatom-girdles. These had been regarded as completely silicified, closed hoops, which, when subdivision of the frustules occurred, would necessitate continuous reduction in size as the new valves were developed within the old girdle. His investigations demonstrated that each girdle consists of two or more open siliceous hoops, held together only by organic matter and therefore capable of sufficient expansion to permit the possibility of repeated subdivision without reduction in size.

In addition to his study of Diatomacae, Chalkley Palmer was the outstanding authority on the algal genus *Trachelomonas* and on the pteridophytic family of the Isoetaceae. It was in connection with the last family that his work was best known to the members of the Philadelphia Botanical Club.

For nearly forty years he was President of the Delaware County Institute of Science, and in his later years he had his laboratory at its museum in Media. At one time he was Director of the Microscopical and Biological Section of the Academy of Natural Sciences, and when this section was reorganized as the Leidy Microscopical Club he became the Club's curator. Most important of all, he was for several years the President of the Academy of Natural Sciences itself. He was a member of numerous scientific organizations, including The Royal Microscopical Society, the Franklin Institute, and the Philadelphia Botanical Club.

BIBLIOGRAPHY

Botanical and other papers by T. C. Palmer were published in the following journals. In addition to these he contributed fifteen papers and notes[1] between

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[1] These contributions, kindly listed for us by Arthur H. Thomas, were as follows: Student 1: 130. Feb 1881—"Mineralogy and Geology" (description of 2 species of feldspar crystals); 1: 158. Mar. 1881—"A bloodthirsty Centipede" (symptoms shown by child bitten by *Cermatia*

1881 and 1890 to "The Student," a monthly educational journal of the Society of Friends published in and near Philadelphia.

PROCEEDINGS OF THE DELAWARE COUNTY INSTITUTE OF SCIENCE

Year 1906: Theory of Freezing Mixtures, Nature of Diatom Motion, Indian Implements of Chester, Rare Local Ferns; 1907: Some Observations on Diatom Motion; 1908: A Familiar Talk on Delaware County Frogs, Does the Diatom Move in Darkness? 1909: The Sluggish Diatom; 1910: Mechanism of Diatom Motion, The Apparatus of Locomotion in Surirella; 1911: Further Notes on Diatoms, Further Notes on Diatom Locomotion, Diatom, Navicula Socialis.

PROCEEDINGS OF THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

Year 1893: Observations on Errant Frustules of Eunotia Major; 1897: Demonstration of Absorption of Carbon Dioxide and Generation of Oxygen by Diatoms; 1900: Structure of the Diatom Girdle (F. J. K. and T. C. P.); 1902: Five New Species of Trachelomonas; 1905: Delaware Valley Forms of Trachelomonas; 1910: Stauroneis Terryi; 1925: Trachelomonas:—New or Notable Species and Variations; 1925: Nomenclature of Trachelomonas.

FERN BULLETIN

Year 1900: Isoetes Dodgei—A New Station.

AMERICAN FERN JOURNAL

Year 1923: A Monograph of Isoetaceae; 1927: A Chinese Isoetes; 1931: Tropical American Isoetes; 1929: Isoetes Lechleri Mett.; 1932: More About Isoetes Lechleri Mett.

BOTANICAL GAZETTE

Volume 21: Notes on Reparia and Isoetes Sacchariti.

WESTONIAN

Year 1929: The Painter Arboretum and Dismal Run.

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forceps); 1: 182. Apr. 1881—"An anomalous Fern (remarkable specimen of *Camptosorus rhizophyllus*); 1: 310–311. July 1881—"Botany" (simpler technique of collecting, identifying and studying specimens); 2: 27. Sept. 1881—"Feldspar Veins" (in gneiss quarries at Leiperville and Chester, Pa.); 2: 188. Feb. 1882—"A mammoth Poison Vine" (growing near Haverford, Pa.); 2: 221 & 252–3. Mar. & Apr. 1882—"A Mineral Locality" (Mineral Hill, near Media, Pa.); 4: 164. Jan. 1884—"Vitality of Plants" (remarkable vitality shown by *Lycopodium dendroideum* and *Talinum teretifolium*); 7: 236–240. May 1887—"A Mountain Ramble in Pennsylvania" (two-day botanical trip in Perry Co., Pa.); 8: 137–145. Feb. 1888—"Three Days at Large" (botanical trip along Octoraro Creek, Susquehanna River, and Broad Creek, Maryland, with mention of finding *Euphorbia Darlingtonii* on Goat Hill); 9: 366–7. May 1889—"An Unfortunate Caption" (defense of Darwinism in reply to a previous paper); 9: 264–8, 294–7, 333–7. Feb.–Apr. 1889—"The Banks of Crum" (along Crum Creek in Delaware Co., Pa.); 10: 91–4, 122–6, 169–172. Oct. 1889, Jan. & Feb. 1890—"Scroggie" (geology and natural history of small valley along Ridley Creek near Media, Pa.); 10: 262–3. May 1890—"Nature Study" (observation before text-books).

General Notes

Deaths of Dr. and Mrs. Britton. During the first half of 1934 there passed away both Dr. and Mrs. Nathaniel Lord Britton, who had been Corresponding Members of the Philadelphia Botanical Club since 1892 and 1895 respectively. Dr. Britton had taken a keen interest in the early life of our Club since its founding in 1892, and both were intimately associated with the group of botanists who figured in its early history. Dr. Britton was known to us all as the chief author of the "Illustrated Flora of the Northern States and Canada," which played such an important part in stimulating renewed interest in the eastern flora at the opening of this century. Mrs. Britton's work lay especially in mosses. Biographical sketches of both the Brittons have recently appeared in the Journal of the New York Botanical Garden, an institution that owes its existence to their initiative and Dr. Britton's genius.

Publication Date of Last Bartonia. Due to delay in sending out copies, BARTONIA, number 15, was actually issued on December 16, rather than the date printed, December 5, 1933.

Program of Meetings During 1933

Date	*Subject*	*Speaker*	*Attendance*
Jan. 26	Plant-Collecting in Colombia	Dr. William Seifriz	37
	Fern Miscellany	Arthur N. Leeds.	
Feb. 23	Plants of Kashmir and Western Tibet	Dr. R. R. Stewart	40
Mar. 23	Early Records of Plant Hybridization	Dr. Conway Zirkle	25
	Discussion of the local species of *Bidens*	Hugh E. Stone.	
Apr. 27	A Trip across South America, down the Amazon	Dr. Roland Holroyd	26
	Exhibition of the Van Brunt Series of Flower Lantern Slides, loaned by the N. Y. Botanical Garden.		
May 25	Plants of the Coast Ranges, Cascades and Rockies	Dr. Edgar T. Wherry	31
Sept. 28	Reports by Members of Summer Observations		16
Oct. 26	Collecting Plants in New Mexico	Hans Wilkens	30
	Gentians of the Philadelphia Region	Dr. John M. Fogg, Jr.	
Nov. 23	An Evening with the Non-Flowering Plants.		
	The Local Algae	Dr. John M. Fogg, Jr.	32
	Mosses and How to Identify Them	Lewis E. Anderson.	
	Interesting Mosses of the Philadelphia Region	Grace M. Tees.	
Dec. 21	Noteworthy Additions to the Academy Herbarium During the Past Few Years	Dr. Francis W. Pennell	30
	Sarracenias and Other Southern Plants	Dr. Edgar T. Wherry.	

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Dr. William Randolph Taylor, University of Michigan, Ann Arbor, Mich.	1921
Dr. Campbell E. Waters, Washington, D. C.	1904
Dr. H. W. Youngken, Mass. College of Pharmacy, Boston, Mass.	1918

RECENTLY DECEASED MEMBERS

	Died
Dr. Nathaniel Lord Britton, Corresponding	June 25, 1934
Mrs. Elizabeth G. Britton, Corresponding	Feb. 25, 1934
William R. Keeney, Active	Feb. 22, 1934
T. Chalkley Palmer, Active	Jan. 31, 1934

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No. 17 1935

BARTONIA

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PHILADELPHIA BOTANICAL CLUB

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BARTONIA

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A journal devoted to the Flora of the mid-eastern and south-eastern United States, especially of eastern Pennsylvania, New Jersey and Delaware.

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Address

DR. FRANCIS W. PENNELL,
Editor,

Academy of Natural Sciences, Logan Square, Philadelphia, Pa.

SAMUEL S. VAN PELT
(1863-1935)

BARTONIA

PROCEEDINGS OF THE PHILADELPHIA BOTANICAL CLUB

No. 17 PHILADELPHIA, PA. 1935

Samuel Smyth Van Pelt

WITMER STONE

I remember Samuel S. Van Pelt as a very retiring member of the senior class of the University of Pennsylvania when I entered as a Freshman in the autumn of 1883, but I did not know him personally until about 1900. One day, when I was in the herbarium room of the Academy of Natural Sciences he came to me to ask about a field-trip which Stewardson Brown was to conduct on behalf of the Botanical Section and which he thought would have to be postponed on account of unfavorable weather.

He was a small man with a black beard and wore glasses. He was of an extremely nervous temperament, and had been persuaded by his uncle to join Brown's botanical trips both as a means of getting exercise and of acquiring some definite interest in life. He had just begun to find such an interest when I became acquainted with him, and it grew apace during the many years that he later spent at the Academy. These years he afterward called the most enjoyable period of his life.

Samuel Smyth Van Pelt, son of Joseph King Turner and Josephine Smyth Van Pelt, was born on April 9, 1863 at 1528 Spruce Street, Philadelphia. At this address he continued to live for most of his life. As a boy he attended the well known Classical Institute of Dr. Faries on Thirteenth between Locust and Spruce Streets, an old-fashioned school where the master still used a rattan. Thence he passed to the University of Pennsylvania, from which he received in 1884 the degree of B. S. in Chemistry. After graduation he entered a chemical factory, but the enterprise met with difficulties and in six months Van Pelt was dropped. This business experience so disgusted him, that, not being compelled to earn his livelihood, he never sought another position but devoted himself to the study of theology and of music. Eventually, he gave up all theologies and argued his attitude toward religion on every opportunity, but, although he did not realize it, he maintained most remarkably in his conduct throughout life underlying religious principles. In music he became an excellent organist, and in summer used to substitute for the regular organist at St. Mark's Church. He played well on the violin. His preference was for classical music, attending many concerts and, with score in hand, following the rendering of the compositions.

Stewardson Brown's botanical trips opened up a new life for Van Pelt. He soon took part in the more serious trips of the Philadelphia Botanical Club, becoming in 1902 a member of it and in 1905 of the Academy of Natural Sciences. Frequenting the Herbarium rooms, he realized the great amount of work that had to be done in mounting specimens contributed by Club members for the Local Herbarium; volunteering for this service and spending every day at the museum, he learned the technique of plant preservation so thoroughly as to produce the most beautiful mounts that the collection has known. He served as Curator of the Club's Herbarium for ten years, from December, 1903 to December, 1913.

Van Pelt held very positive ideas on many subjects. One of these was the sacredness of all life, and at first he was quite unwilling to collect a specimen in the field. Many a time have I seen him on his knees studying the flowers and leaves of some abundant weed, but without breaking off a single fragment. Later, he was induced to take home a single flower in a pill-box, so as to examine it at leisure. He proclaimed vigorously and emphatically against the wretched specimens that some men brought to the Herbarium, and this, together with the realization that he could himself make really good specimens, finally brought him to the collecting stage. Even then he never gathered more than he could prepare in the best possible manner,[1] and protested volubly against my collecting one hundred or more specimens in a day when I was procuring material for my "South Jersey Flora".

Regular occupation and association with congenial companions were of the greatest benefit to him physically and mentally, and to some extent he lost the extreme nervousness that had characterized his earlier years. He made many trips to various parts of southern New Jersey and to the mountains of Pennsylvania, his primary interest being in the area covered by the Local Herbarium so that everything gotten might go to its enlargement. He would take a long trip by himself to obtain the flowering or fruiting stage of a single plant that was lacking in the collection. On the many excursions which we shared I could not have asked for a more congenial or generous companion or one more interested in the work in hand. It mattered not if the heat of midsummer made walking in the sun almost unendurable, or a downpour of rain drenched us to the skin, or hordes of mosquitoes harassed us, he maintained his good humor and carried out the purpose of the trip without complaint. From a mere tyro he became in a few years a recognized authority on the flora of Philadelphia and vicinity, and the amount of knowledge that he acquired was astonishing.

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[1] The specimens gathered by Van Pelt for the Academy's Local Herbarium are the most beautiful that I have ever seen. He developed a special technique for rapid drying, so that color has in many cases persisted remarkably well. He had also an artistic sense for the effective display of plants on the herbarium sheets.—EDITOR.

The meetings of the Botanical Club were a source of the greatest delight. He was accustomed to display on the walls of the room the rarities or other interesting specimens secured since the last meeting, or else those that would be needed by some speaker who was to address the Club. He was particularly active at the annual meetings, showing them the species added to the Local Herbarium during the year and also providing much of the material refreshment that was served on those occasions.

In Bartonia, too, he became deeply interested, helping to finance it and contributing notes and papers to its pages. Delightful reports of " Botanical Trips to Northampton County ", Pennsylvania, in 1908 and 1909 appeared in the first two numbers of Bartonia. It was characteristic of Van Pelt's generosity that in his will he left the Club sufficient funds to continue his customary annual contribution toward its maintenance.

For the last fifteen years or more of his life he lived at Chestnut Hill at the northern extremity of the city, and seldom visited the Museum or attended the Club meetings. From 1917 he was an honorary member of the Club. The passing of his old associates, Stewardson Brown, Charles S. Williamson and Henry A. Lang, naturally changed the atmosphere of the Herbarium and it lost much of the charm that it had formerly held for him. His health too began to fail, and after a period of illness he passed quietly away on June 28, 1935, completing a life of service and of generosity that extended to many more individuals than we shall ever know.

A New Gentian from Georgia

W. P. LEMMON

A two-year study of a species of *Dasystephana* (or *Gentiana*) found in Cobb and adjoining counties, Georgia, indicates a new species in some ways intermediate between the lowland *D. latifolia* (Chapman) Small and the Blue Ridge *D. decora* (Pollard), although clearly nearer to the former. All these species have narrowly campanulate corollas with fringed plaits between the lobes, cohering anthers, leaf-blades narrowed to base, and finely pubescent or puberulent stems. As contrasted with *D. decora* the new species agrees with *D. latifolia* in the corolla-lobes being obviously longer and wider than the plaits, calyx-tube puberulent only on the ridges, and leaf-blades more obviously sessile; characteristic of *D. decora* are the thin, acuminate leaf-blades, the more pubescent calyx-tube, and the short corolla-lobes that only slightly exceed the wide plaits.

But from *Dasystephana latifolio* the new species is clearly distinct. That species is characterized by elliptic to oval leaf-blades, the larger 3–7 cm. long, 1–2.5 cm. wide, obtusish to slightly acuminate at apex, whereas in the new species the blades are narrowed and longer, the larger being 7–9 cm. long, 0.7–1 cm. wide, and attenuate-acuminate at apex. Again in *G. latifolia* the corolla appears to be nearly violet in color, whereas in the new species it is much more blue. This combination of narrowly lanceolate leaves and blue corollas distinguishes it clearly from its near allies. Because apparently restricted to the territory anciently occupied by the Cherokee Indians, it may be known as the Cherokee Gentian, **Dasystephana cherokeensis** Lemmon, spec. nov., and defined as follows:

Plant 2 to 6 dm. tall. Stem puberulent, usually simple, sometimes with short floriferous branches. Leaves 7–10 cm. long, the blades narrowly lanceolate, narrowed to base and attenuate-acuminate to apex, thin in texture, the margins scabrous; the upper blades sometimes nearly linear. Flowers in terminal clusters, or terminal on axillary branches, sessile. Calyx-tube 10–12 mm. long, finely pubescent to glabrous on the ridges; the lobes spreading or recurved, linear-spatulate to linear, from slightly shorter to slightly longer than the tube, their margins scabrous. Corolla mostly 35–45 mm. long, campanulate, deep to light blue, occasionally tinged with purple: the tube 25–40 mm. long; the lobes 5–10 mm. long, ovate, acute, spreading to ascending; the plaits, which are sometimes nearly white, shorter than the lobes, deeply bifid, the segments long-attenuate, entire or rarely erose or with slightly incised teeth. Stamens cohering in ring.

(Caulis 2–4 dm. altus, minute pubescens; folia anguste lanceolata, 3–10 cm. longa; calycis lobae tubam aequantes; corolla 30–50 mm. longa, caerulea, lobis plicas bifidas longioribus; capsula non visa.)

Type, north end of Black Jack Mountain, Cobb County, Georgia, collected in flower in October, 1935 by W. P. Lemmon; in Herb. Academy of Natural Sciences of Philadelphia.

Cobb and adjoining counties in the Piedmont physiographic province, Georgia.

MARIETTA, GEORGIA.

Polemonium and Polemoniella in the Eastern States

Edgar T. Wherry

In contrast with the genus *Phlox*, already treated in these pages, the other genera of the family *Polemoniaceae* are but sparsely represented east of the Mississippi River. Two species of *Polemonium* and one each of *Collomia* and of *Ipomopsis* comprise the total of native species, while less than half a dozen other members of the family appear as occasional adventives. Before passing to the study of the far more numerous western representatives, however, the assembling of data on these eastern ones seems worth while, and the results will be presented in two papers, of which this is the first. *Polemonium* and allied genera are characterized by their pinnately compound alternate leaves with relatively large elliptic leaflets; by their wholly herbaceous, accrescent calyx; by their campanulate (or rarely funnelform) corolla, of which the hue is blue-violet or violet-blue, (exceptionally pink or even yellow) and by their blackish obscurely polyhedral spindle-shaped seeds. As in *Phlox*, the corolla is actinomorphic, but the stamens are distinctly zygomorphic; and there are three fused carpels with the styles united up to their stigmatic tips. The segregated minor genus *Polemoniella* is distinguished by annual duration and greatly reduced inflorescence, the inconspicuous grayish flowers having short, practically equal stamens, and being self-pollinated.

POLEMONIUM [TOURNEFORT] LINNÉ

This genus name, the derivation of which has never been adequately explained, was used by Tournefort[2] in 1700 for a plant which had been classed by other writers as a *Valeriana*. Linné[3] defined it more fully in his Genera Plantarum, being acquainted at that time with a single European species. In the first edition of his Species Plantarum[4] he listed three, and in the second edition[5] as many as five, although all but the first two of these are now placed in other genera. A key for distinguishing the two species recognized in the eastern United States is given on the following page.

Various common names are ascribed to this genus in the literature, although few of them are in actual use. Perhaps the most frequent is " Greek Valerian," a translation of the term *Valeriana graeca* applied to some similar plant by early herbalists. Another often seen is " Jacob's-ladder," in reference to the ladder-

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[1] Contribution from the Botanical Laboratory and Morris Arboretum of the University of Pennsylvania.

[2] Inst. Rei Herb. **1**: 146; **2**: pl. 61, 1700.

[3] Genera Plantarum: 46, 1737.

[4] Species Plantarum: 162, 1753.

[5] Species Plantarum, ed. 2. **1**: 230, 1762.

like arrangement of the leaflets. The name most used by laymen is " Bluebells," but as this is also applied to species of *Campanula, Mertensia,* etc., it is not sufficiently distinctive. Possible modifications would be " Fernleaf Bluebell " or " Bluebell Valerian," but, like the occasionally heard " False Forgetmenot " these are too cumbersome. The layman who already uses without hesitancy such names as Chrysanthemum, Delphinium, and Geranium should have no difficulty in adopting the genus name Polemonium itself for a " common name."

POLEMONIUM: KEY TO EASTERN SPECIES

Stem relatively strong, 75 to 125 cm. tall; principal leaves divided into 11 to 21 leaflets; inflorescence a narrow panicle; corolla-color rather deep violet; stamens declined, subparallel, exserted; anthers orange-yellow ....1. *P. vanbruntiae.*

Stem relatively weak, 25 to 75 cm. tall; principal leaves divided into 7 to 15 leaflets; inflorescence a wide panicle; corolla-color rather light blue-violet; stamens irregularly decumbent, included; anthers cream-color ....2. *P. reptans*

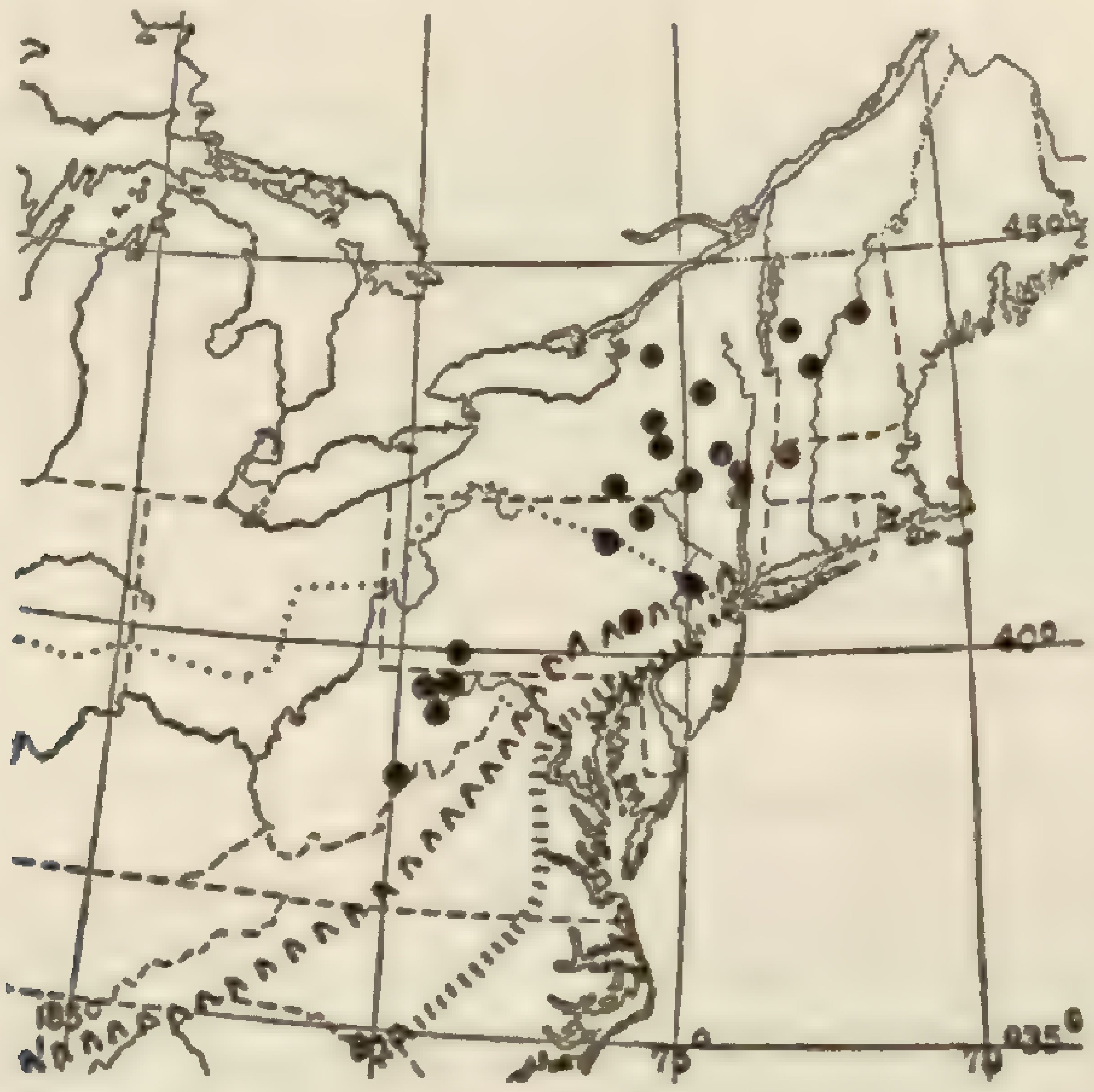

Fig. 1. Distribution of *Polemonium vanbruntiae.*

1. **Polemonium vanbruntiae** Britton. Tall Polemonium. Plate 2, Fig. 1.

History.—This Polemonium was apparently first observed in Schoharie County, New York, by a Dr. E. C. Howe about 1860, and was included in the list of addenda to the fourth edition of Gray's Manual[1] under the name *P. coeruleum.* In subsequent years its known range gradually increased, although it was long referred to that European species. Its distinctness was first urged by Britton[2] who in 1892 named it in honor of Mrs. Van Brunt. The original form of the name was Van-Bruntiae, but the writer prefers condensation and decapitalization of all species names.

Geography.—During the Glacial epoch this plant evidently survived in the uplands of western Maryland and adjoining states, and subsequent to the melting

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[1] Man. Botany N. U. S., ed. 4: xcvi, 1863.

[2] Bull. Torrey Bot. Club **19**: 224, 1892.

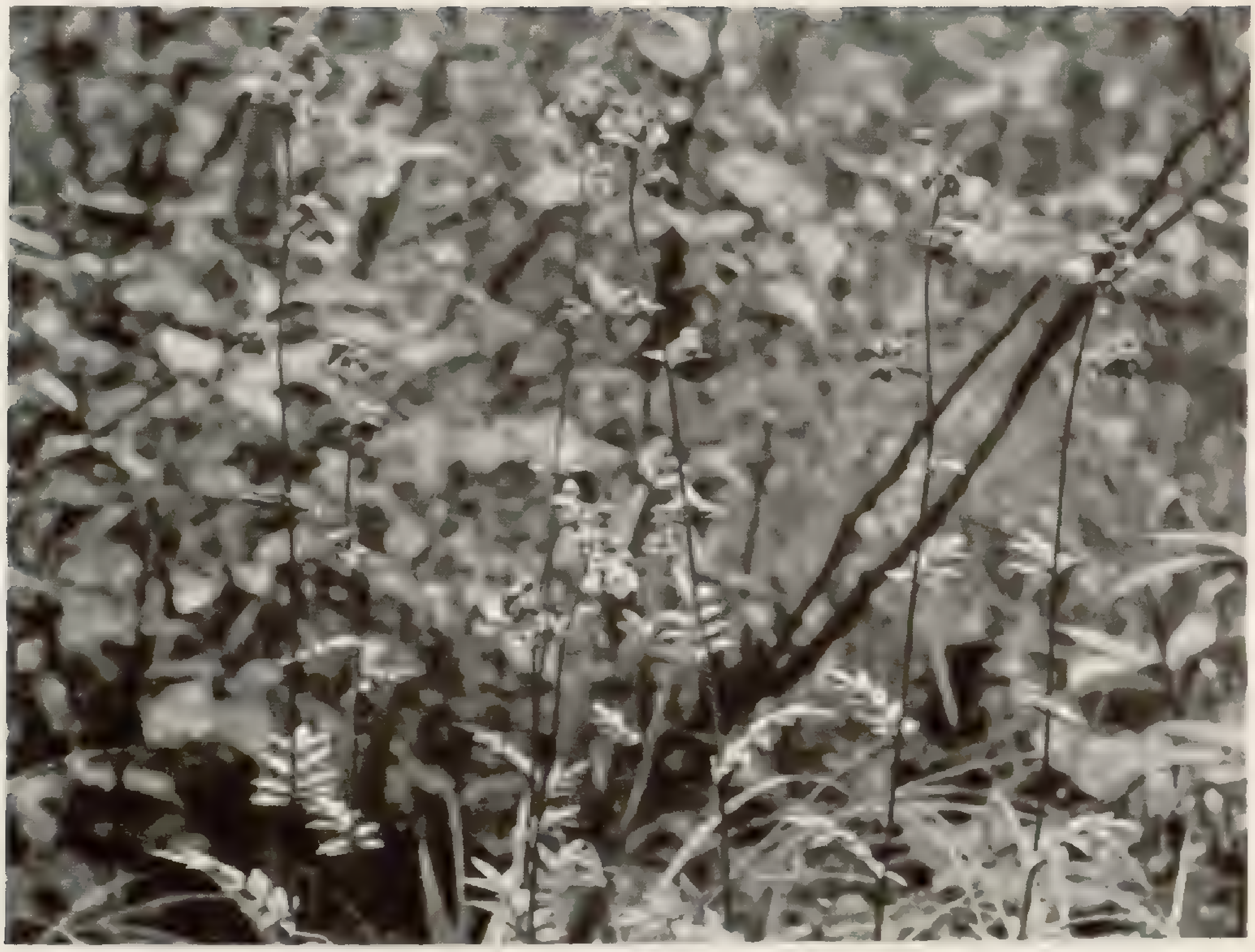

FIG. 1. *Polemonium vanbruntiae* Britton.
Georgetown Station, Madison County, New York.

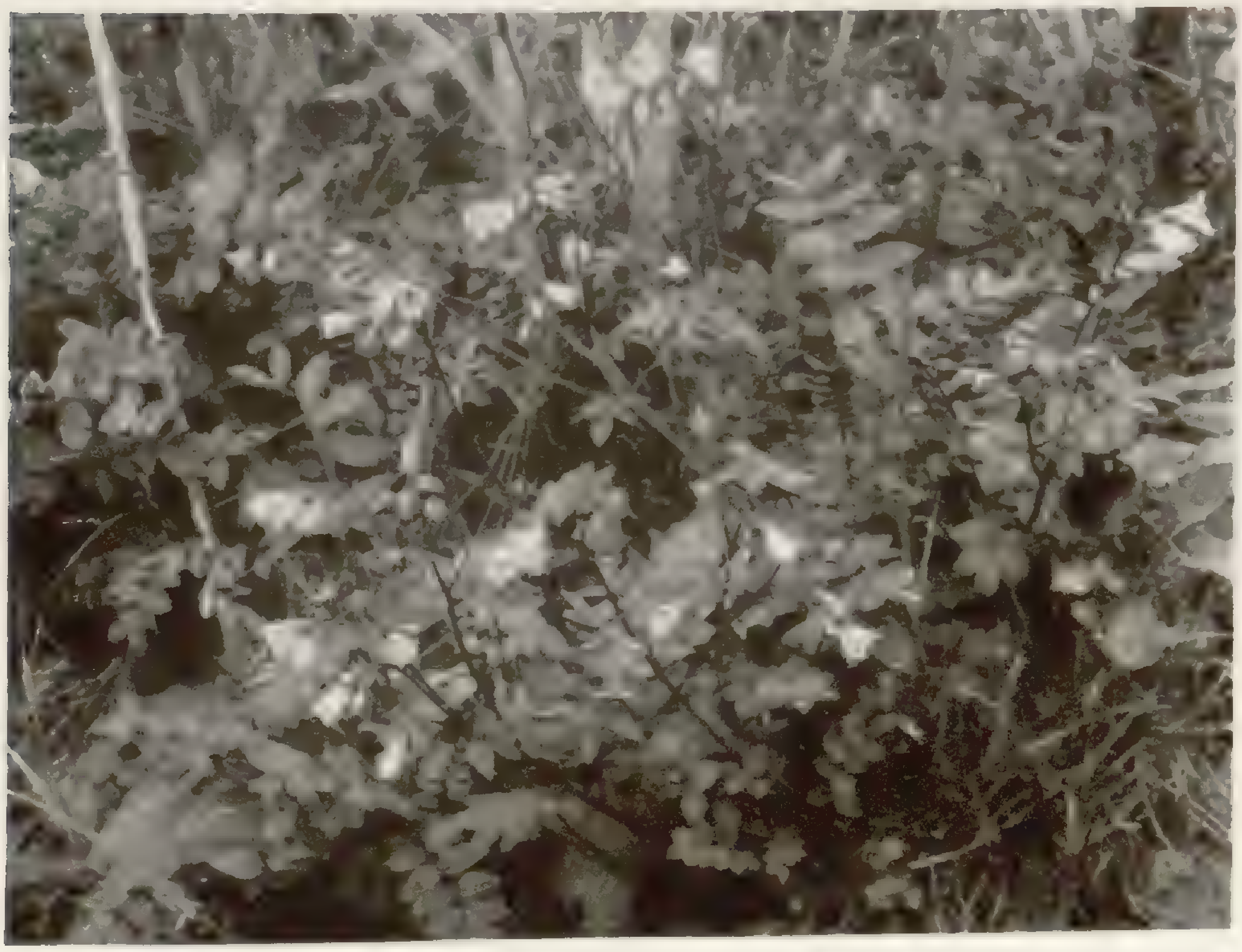

FIG. 2. *Polemonium reptans* Linné.
East of Mountain Lake, Garrett County, Maryland.

away of the last ice sheet succeeding in migrating into the glaciated territory as far as northern Vermont (or New Hampshire). The state and county list is:

Connecticut: Known only in Litchfield County (inadvertently marked too far north on the map.)

Maryland: Occasional in Garrett^f County; reports from lowland counties are based on misidentifications.

[New Hampshire: Reported from Grafton County, but doubtful.]

New Jersey: Specimens are widely distributed in herbaria from a swamp two miles north of Washington, Warren County, although search for the plant there in recent years has proved unsuccessful. Mistakenly reported from Morris Co.

New York: Reaches its maximum development in this state, being known from over 20 localities distributed through 10 counties: Chenango, Delaware, Greene, Herkimer^f, Lewis Madison^f, Schoharie, Sullivan, Tioga and Ulster.

Pennsylvania: Shows a curiously interrupted distribution, having been collected in Berks, Somerset^f, Sullivan, and Wayne counties only.

Vermont: Native in Addison and Windsor counties, escaped elsewhere.

West Virginia: Found at high altitudes in 3 eastern counties, Pocahontas^f, Preston, and Tucker^f, the first being its southernmost known station.

Ecology.—This Polemonium is a swamp plant, its rootstocks creeping through hummocks of mosses, sedges, and shrub-bases. Even though the water beneath the surface may be alkaline, the humus into which its roots extend is almost always subacid or low mediacid. In successions it occupies an intermediate position, dying out as climax forests develop. Its dark purple-violet[1] flowers are borne chiefly in mid-summer, and are cross-pollinated by bees.

Taxonomy.—The original assignment of this plant to *P. coeruleum* Linné is easily understood, for it is closely related to that European species, having evidently descended from the same circumboreal ancestor. Indeed, few of the characters considered by Britton to justify its segregation as an independent species are really distinctive. The European plant, when growing in moist soil, may develop a horizontal rootstock much like that in the American one; the petal-tips vary from rounded to mucronulate in both. Supposed differences in accrescence of calyx do not appear to be significant, as when fully fertilized both species develop rather numerous seeds, leading to marked enlargement of the ovary and consequent distension of the calyx. So far as I can discover, from study of herbarium sheets as well as living material of both, the chief differences consist in the American plant having slightly broader and fewer leaflets, and longer, more nearly parallel stamens. In the interest of simplicity their specific distinctness is here maintained, pending further work on related west-American plants.

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[1] In Maerz and Paul's Dictionary of Color ranging from 42 H 8 to 42 J 10 and to 43 J 9, that is, a moderately deep and slightly grayed violet.

2. **Polemonium reptans** Linné. Low Polemonium. Plate 2, Fig. 2.

History.—In the first edition of the Flora Virginica, published in 1739, Gronovius [1] referred to a "Polemonium foliis pinnatis, radicibus reptatricibus. Clayt. n. 249." According to the correspondence assembled by Darlington,[2] roots of what was evidently the same species were sent by John Bartram to Peter Collinson in 1740. The latter at first questioned its distinctness from the European "Greek Valerian", but later noted differences between them in stature and blooming-time. Linné [3] cited the Gronovius record under the European *P. coeruleum* in the first edition of the Species Plantarum; later, however, he saw a color-plate of it among the illustrations of plants in the Gardeners' Dictionary by Miller,[4] and, realizing their distinctness, gave the American species the name it now bears, in the 1759 edition of his System.[5] As the plant illustrated had been sent by Clayton to Gronovius, the type locality of the species is to be taken as eastern Virginia.

Not feeling bound by the principle of priority, Salisbury [6] proposed the appropriate name *P. humile,* but the rules of nomenclature prevent its adoption. On the other hand, one published by Rafinesque,[7] *P. quadriflorum,* is meaningless and well deserves rejection. Many years later Brand [8] based a variety β *macrophyllum* on a specimen showing abnormally large leaflets, and Wetzstein [9] termed the albino mutation *P. reptans album.*

Geography.—In contrast to the other eastern species, *Polemonium reptans* is both common and widespread, having a range nearly as vast as that of *Phlox divaricata.* Though rare in the Coastal Plain, it is abundant in piedmont, montane, and interior physiographic provinces, from northwestern Georgia to Arkansas, easternmost South Dakota, and central New York state.

ALABAMA: Known in 6 Appalachian counties: Colbert, Cullman, Madison, Marshall[f], Morgan[f], and Tuscaloosa, the last a southern limit.

ARKANSAS: Probably occurs nearly throughout the northern part, having been observed by Nuttall in 1819 along the Mississippi river, and collected in recent years in Benton, Carroll[f], Crawford, Cross, Franklin, Madison, Marion, Newton, Polk, and Washington[f] counties.

[CONNECTICUT: Escaped from cultivation in 4 counties: Fairfield[x], Hartford[x], Litchfield[x], and New Haven[x].]

DELAWARE: Frequent on the piedmont in New Castle[f] County.

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[1] Flora Virginica: 22, 1739; ed. 2: 29, 1762.

[2] Memorials Bartram and Marshall: 138, 155, 1849.

[3] Species Plantarum: 162, 1753.

[4] Figs. Plants Miller's Gardeners' Dict. **2**: pl. 209, 1758.

[5] Systema Naturae, ed. 10. **2**: 925, 1759.

[6] Prodromus Stirpium, etc.: 125, 1796.

[7] Atlantic Journal: 177, 1833.

[8] In Engler's Pflanzenreich **IV. 250**: 33, 1907.

[9] Proc. Ohio State Acad. Sci. **4**: 361, 1906.

District of Columbia: Occasional along Rock Creek valley[f].

Georgia: Said by Elliott to grow " in the vallies of the mountains," and definitely known in Floyd County.

Illinois: Occurs throughout, specimens having been seen from the following counties: Champaign, Cook, Du Page, Gallatin, Hancock, Henderson, Jackson[f], Jefferson, Jo Daviess, Kane, Kankakee, Lake, La Salle, McHenry, Montgomery, Ogle, Peoria, Randolph, Rock Island, St. Clair, Schuyler, Stark, Vermilion, Wabash, Warren, Will, and Winnebago.

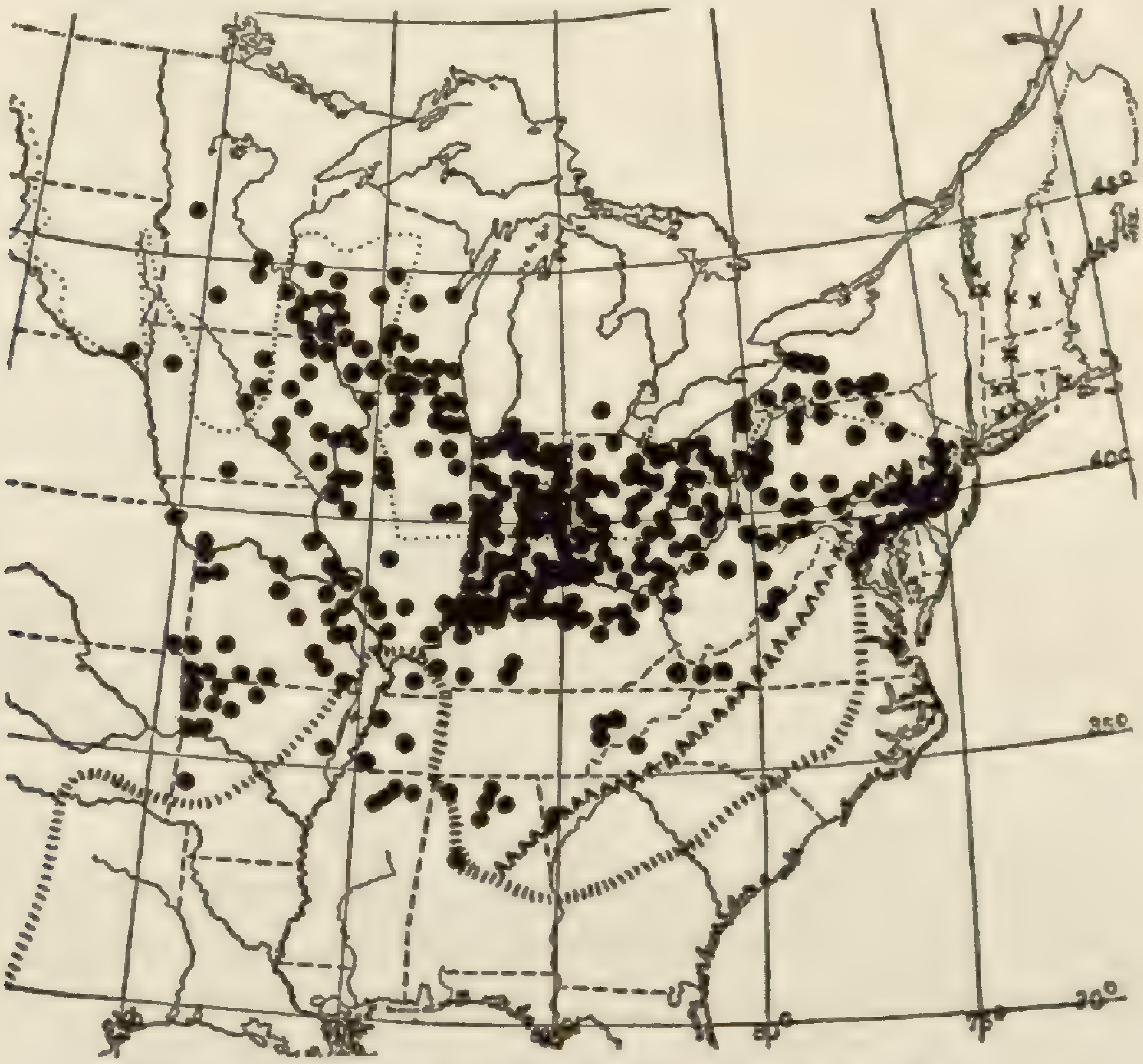

Fig. 2. Distribution of *Polemonium reptans.*

Indiana: More fully collected than in any other state, in Adams, Allen, Blackford, Brown, Carroll, Cass, Clark, Crawford, Daviess, Dearborn, Decatur, De Kalb, Delaware, Dubois, Elkhart, Fayette, Fountain, Franklin, Gibson, Grant, Greene, Hamilton, Hancock, Harrison, Henry, Howard, Jackson, Jay, Jefferson, Jennings, Johnson, Knox, Kosciusko, Lake, Laporte, Lawrence, Madison, Marion, Marshall, Miami, Monroe, Montgomery, Newton, Noble, Ohio, Orange, Owen, Parke, Perry[f], Pike, Porter, Posey, Putnam, Randolph, Ripley, St. Joseph, Scott, Spencer[f], Sullivan, Switzerland, Tippecanoe, Tipton, Union, Vermilion, Vigo, Wabash, Warren, Warrick, Washington, Wayne, Wells, White and Whitley, a total of 73 counties.

Iowa: Widespread, there being 16 county records: Allamakee, Benton, Black Hawk, Cerro Gordo, Cherokee, Decatur, Fayette, Hardin, Henry, Johnson, Mahaska, Muscatine, Poweshiek, Scott, Story, and Winneshiek.

Kansas: Barely enters the state, in Cherokee and Doniphan counties.

Kentucky: Probably present throughout, though known to have been collected in but 18 counties: Anderson, Bath, Carter, Christian^{f}, Edmonson, Estill, Fayette, Franklin, Graves^{f}, Henderson, Jefferson, Kenton^{f}, Lyon, Morgan, Owen^{f}, Rowan^{f}, Shelby and Warren.

Maryland: Known in 8 counties, all above the Fall Line: Allegany, Baltimore, Carroll, Cecil^{f}, Garrett^{f}, Harford, Howard^{f}, and Montgomery^{f}.

[Massachusetts: Escaped in Hampshire^{x} County.]

Michigan: Reported only in Berrien and Washtenaw counties.

Minnesota: Extends into several of the southern counties: Brown, Douglas, Fillmore, Goodhue, Hennepin, Houston, Olmsted, Scott, Wabasha, and Winona. The second-named is the northwesternmost station for the species.

Mississippi: Rare, and limited to the northeastern counties: Lafayette, Prentiss, Tippah, and Union.

Missouri: Common throughout, with 24 counties represented by collections: Barry, Boone, Butler, Carter, Cass, Clay, Cole, Franklin, Greene, Iron, Jackson, Jasper, Jefferson, Johnson, Lincoln, McDonald, Ozark, Phelps, Ralls, St. Charles, St. Francois, St. Louis^{f}, Shannon, Taney, and Washington.

[New Hampshire: Escaped in two or three counties.]

New Jersey: Barely enters along the Delaware valley, there being records for 6 counties: Burlington, Camden, Hunterdon, Mercer, Salem, and Warren.

New York: Occasional westward, in Allegany, Cattaraugus, Chautauqua, Chemung, Erie, Livingston, Steuben, Tioga, and Wyoming counties.

North Carolina: Reported only from Haywood County.

Ohio: Occurs throughout, there being 53 counties in the list: Adams, Allen, Athens^{f}, Auglaize, Belmont, Butler, Clark, Clermont, Columbiana, Coshocton^{f}, Crawford, Cuyahoga, Darke, Defiance, Delaware, Erie, Fairfield^{f}, Franklin, Gallia, Geauga, Greene, Guernsey, Hamilton^{f}, Hardin, Harrison^{f}, Highland^{f}, Holmes, Huron, Jackson, Lawrence, Licking, Lorain, Lucas, Mahoning, Medina, Mercer, Miami, Monroe, Montgomery, Morrow, Perry, Pike, Portage, Preble, Richland, Ross, Seneca, Stark, Van Wert, Warren, Washington, Wayne, and Wyandot.

Pennsylvania: Fairly common, except in central and northeast portions; county list: Allegheny, Armstrong, Bedford, Berks, Bradford, Bucks, Butler, Cambria, Chester^{f}, Clarion, Crawford, Cumberland, Delaware^{f}, Elk, Erie, Franklin, Huntingdon, Lancaster, Lawrence, Luzerne, Lycoming, McKean, Montgomery^{f}, Philadelphia, Potter, Somerset, Westmoreland, and York^{f}.

[South Carolina: Elliott's report of it in " vallies " refers to Georgia.]

South Dakota: Reaches a western limit in Clay County.

Tennessee: Though stated by Gattinger to occur " over the state," specimens have been seen from but 6 counties: Blount, Dyer, Jefferson, Knox, Madison, and Shelby, 3 of these lying near the eastern, and 3 near the western, end.

[Vermont: Escaped in Addison^{x}, Caledonia^{x}, and Rutland^{x} counties.]

VIRGINIA: Widely distributed, but known to have been collected only in 7 counties: Bath, Fairfax, Highland^f, Russell, Smyth, Wythe, and York.

WEST VIRGINIA: Occasional along the Ohio river and in a few upland counties: Cabell, Gilmer, Monongalia, Ohio, Preston, Randolph, and Wood.

WISCONSIN: Common in the southern half of the state, in Adams, Brown, Buffalo, Columbia, Dane^f, Dunn, Eau Claire, Grant, Green, Iowa, Jefferson, La Crosse, Marathon, Milwaukee, Richland, Rock, Sauk, Trempealeau, Vernon, Walworth, Waukesha, Waupaca, and Wood counties.

Ecology.—One reason for the wide dispersal of *Polemonium reptans* is its extraordinary adaptability. Although reaching its maximum luxuriance in circumneutral soil on alluvial flats, it also grows in fertile loam over limestone, in sterile, more or less acid clay, in the decidedly acid litter in upland oak woods, and even, at least marginally, in mediacid sphagnum bogs. Moisture may be abundant throughout the year, or for but a few weeks in spring. In its favorite situations there is usually plenty of light early in the year, but it can adapt itself to all variations from full sun to deep shade during the rest of the growing season. Occasionally a pioneer in meadow lands, it becomes abundant in intermediate successional stages, and often remains so into the final climax forest.

In a classification according to blooming season, this *Polemonium* is to be considered pre-vernal. Shoots begin to arise from the crowns in the Fall, persist even through winter temperatures below zero F., and resume growth while the air is still rather cold. The flowers begin to open toward the end of March in the southern part of its range, or of April northward. Anthesis lasts a few weeks, and the seeds are soon ripened and dispersed. Robertson[1] noted that insects land on the anthers of the lower stamens and insert their tongues between the shorter upper ones. Visitors observed comprised 38 hymenoptera—one named *Andraena polemonii* Rob.—and 12 members of other classes.

Variation and taxonomy.—Polemonium reptans is variable in many respects. There is extreme variation in the size of the plant and of the leaves and leaflets, while the corolla in some individuals is fully twice as large as in others. Though it is usually described as glabrous or nearly so, there is a tendency for the stem and even the leaf-rachises to become sparsely covered with long hairs. This is perhaps more frequent westward, but is by no means lacking at the eastern margin of the range. Another tendency is for the leaflets to become confluent, at least toward the tip of the leaf. Rafinesque gave this as one of the features of a supposedly distinct species from Arkansas, but it sometimes appears in the east as well. The corolla is normally of a light violet hue,[2] although pallid, albino, purplish and deep violet mutants are occasionally found. In the opinion of the writer all of these variations should be regarded as of formal rank, and as deserving no special names.

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[1] Trans. Acad. Sci. St. Louis **5**: 578, 1891. Flowers & Insects: 152, 1928.

[2] In Maerz and Paul's Dictionary of Color ranging from 41 B 6 to 41 G 9, or light violet-blue to blue-violet, and often around Wistaria Violet.

FORMS OF POLEMONIUM REPTANS

Stem pilose. Termed the "western form" by Coulter,[1] but collected by the writer as far east as Chester and Delaware counties, Penna.

Leaflets enlarged, up to 6 cm. long. *P. r.* var. *macrophyllum* Brand. Occasional northwestward.

Leaflets terminally confluent. *P. quadriflorum* Rafinesque. Rare but widespread.

Corolla pale or white. *P. r. album* Wetzstein. May develop in any colony.

Cultivation.—Introduced into horticulture by Clayton, through Gronovius, about 1730, and by Bartram through Collinson, in 1740. Owing to its adaptability to growth under a wide variety of conditions, responds well to cultivation, thriving alike in the border, the rock garden, and the woodland.

POLEMONIELLA HELLER

Taxonomists have often been criticized for splitting genera on inconsequential grounds, but in the present case the segregation of *Polemoniella* from *Polemonium* by Heller[2] seems fully justified. The new genus clearly represents an evolutionary development from the older one, the changes comprising perennial to annual duration, compound to simple inflorescence, large showy violet corolla to small inconspicuous whitish one, long declined unequal to short spreading equal stamens, and style extending beyond anthers to holding stigmas in the midst of anthers so that cross-pollination by insects has given way to self-pollination. Three species have been recognized, one native to western North America, the others to southern South America.

Polemoniella micrantha (Bentham) Heller

Discovered by Douglas in the Columbia valley in the 1820's, the plant was named by Bentham[3] *Polemonium micranthum* in 1845. Peter[4] in 1891 divided the genus *Polemonium* into three sections, placing this species in one named *Polemoniastrum.* Thirteen years later Heller (*loc cit.*) pointed out its differences from the typical Polemoniums, and made the combination here accepted.

A specimen of this plant collected near Milton, Norfolk County, Massachusetts, is preserved in the New England Botanical Club collection at the Gray Herbarium. It may turn up elsewhere, especially in fields where grass seed from the northwest has been sown. It is, however, unlikely to become a pest, because it is a diminutive winter annual which flowers in early spring, ripens its seed in a few weeks, and then vanishes.

The remaining eastern representatives of the family *Polemoniaceae* will be discussed in the next number of BARTONIA.

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[1] Cat. Flg. Plts. & Ferns indig. to Indiana: 891, 1900.

[2] Muhlenbergia **1**: 57, 1904.

[3] In DC. Prodromus **9**: 318, 1845.

[4] In Engler & Prantl Pflanzenfam. **4**^{3a}: 52, 1891.

Some Aspects of Plant Distribution in the Hudson River Estuary

ROGERS McVAUGH

A most interesting problem is that of the post-glacial distribution of maritime and coastal-plain plants along certain inland waterways like the Great Lakes and the Hudson-Mohawk rivers. This has been discussed at some length by Peattie (4), Svenson (8), and others, and it is not the purpose of the present article to consider the question in detail. It seems desirable, however, to emphasize further some similarities between the upper part of the Hudson River estuary, and more southern or coastal regions such as Delaware Bay. The connection is especially noticeable in plants of tidal mud, and those of sandy or dry places.

This problem was originally suggested by the perusal of a list of 45 plants " growing in the vicinity of the city of Hudson " (N. Y.), read before the Albany Institute, Feb. 16, 1825, by Cyrus M. Stebbins (6). 2 names on this list proved to be synonyms for others also given, and 2 (*Ligustrum vulgare* and *Ligusticum levisticum*) introductions from Europe. 3 names (*Stellaria palustris, Sparganium natans, Arabis hispida*), were too doubtful in application to be considered critically although the first may be *S. longifolia* Muhl., and the last perhaps refers to *A. lyrata* L., both of which occur in eastern New York. 4 names pertain to plants of northern, rather than southern, ranges: *Bromus ciliatus, Monotropa procera* (=*Pterospora Andromedae* Nutt.), *Gnaphalium decurrens, Ranunculus reptans.* Of the remaining 34 plants, 12 were of quite general distribution, although mostly of southern rather than northern affinities, and 22 were common southward or south-westward, but seemed rare enough in this part of the Hudson Valley to make them interesting.

The city of Hudson is located on the east side of the Hudson River, 114 miles north of New York City, on a ridge jutting out between two shallow ' bays ' in the estuary. The ' South Bay ' is fed by a small brook, and is now nearly filled with debris from a nearby cement plant; it is about a half mile wide, and extends southward to the base of ' Mount Merino ', a hill of about 550 feet elevation, which rises directly from the river and has numerous shale outcrops and steep shaly slopes. About two miles to the southeast of the city lies ' Becraft Mountain ', which is a flat rocky plateau some two miles long (about 400 feet in elevation), surrounded by limestone cliffs. In Stebbins' time, these places were no doubt much less disturbed than at present, and, being close at hand, they probably formed his chief collecting grounds.

It seems evident from inspection of the list that the plants which interested Stebbins the most were those of the relatively specialized habitats given above, or the rarer plants in the woods nearby. It would also appear that many were rare in the vicinity because there they were there approaching the northern or northeastern limits of their ranges.

A glance at the remaining 34 names of the original list will make this clearer:

a) Plants of more or less general occurrence in the region under discussion (The names as given are mostly those of Gray's Manual, Edition 7, in doubtful cases Stebbins' names are given in parentheses): *Asplenium Ruta-muraria* L.; *Peltandra virginica* (L.) Kunth; *Lemna trisulca* L.; *Smilacina stellata* (L.) Desf.; *Habenaria lacera* (Michx.) R. Br.; *Aplectrum hyemale* (Muhl.) Torr.; *Adlumia fungosa* (Ait.) Greene; *Amphicarpa monoica* (L.) Ell.; *Hypericum gentianoides* (L.) BSP.; *Gratiola neglecta* Torr. (*G. officinalis, G. pubescens*); *Orobanche uniflora* L.; *Helianthus strumosus* L.

b) Plants now considered infrequent or rare northward in the Hudson Valley: *Asplenium montanum* Willd.; *Sparganium eurycarpum* Engelm. (*S. simplex*); *Arisaema Dracontium* (L) Schott; *Orontium aquaticum* L.; *Heteranthera reniformis* R. & P.; *Chamaelirium luteum* (L.) Gray. (*Helonias dioica*); *Polygonatum biflorum* (Walt.) Ell. (*Convallaria angustifolia*); *Habenaria cristata* (Mx.) R. Br. (*Orchis cristata*); *Quercus falcata* Mx.; *Acnida cannabina* L.; *Cimicifuga racemosa* (L.) Nutt.; *Hydrastis canadensis* L.; *Liriodendron Tulipifera* L.; *Polygala sanguinea* L. (*P. sanguinea, P. viridescens*); *Opuntia vulgaris* Mill.; *Ludvigia alternifolia* L.; *Kalmia latifolia* L.; *Physostegia virginiana* (L.) Benth.; *Mimulus alatus* Ait.; *Aureolaria pedicularia* (L.) Raf.; *Campanula americana* L. (*C. acuminata*); *Krigia amplexicaulis* Nutt.

The plants in list (a), above (that is, those of general occurrence), may be dismissed with the statement that all of them are found today frequently or commonly within ten miles of Hudson, except *Aplectrum*, which is unknown at present, and *Adlumia*, which is rare. It is worth noting, however, that none of these species is boreal in character, with the possible exception of the widespread *Smilacina stellata.*

List (b), above, of 22 plants, may be considered more carefully, with the emphasis on present-day occurrences of the species comprising it. The present writer has had the opportunity during the summers of 1933, -34, and -35 to study the flora of this part of the Hudson Valley in the field, and the following notes are written as a partial result:

Of the 22 names two seem scarcely credible, being typically plants of New Jersey and southward: *Quercus falcata* and *Orchis* (*Habenaria*) *cristata.* The first, however, may be *Q. ilicifolia* Wang., which is frequent in the Hudson Valley, and the second is perhaps *H. ciliaris* (L.) R. Br., which occurs north to Albany, according to House (2).

Hyoseris (*Krigia*) *amplexicaulis,* known from southern New York, may occur near Hudson, although unknown at present, as may also *Chamaelirium luteum,* which has been reported several times from the Hudson Valley. *Hydrastis canadensis* and *Campanula americana,* which have both been reported as far east as eastern New York, are now known definitely only from the western part of the state.

The other 16 plants on the list are to be found growing* in the neighborhood of Hudson. *Asplenium montanum* occurs at Stissing Mountain, Dutchess Co., where collected by L. H. Hoysradt (in herb. Univ. Penna.); there is some probability that Stebbins confused this species with *A. Ruta-muraria* L., which is frequent near Hudson. There is a well-known station for *Opuntia vulgaris* on the shaly slopes of Mount Merino, just south of Hudson. *Sparganium eurycarpum, Orontium, Heteranthera reniformis* and *Acnida* are found quite commonly in tidal mud along the Hudson River, while *Ludvigia alternifolia* and *Mimulus alatus* are occasional in springy places near the river.

Cimicifuga, Liriodendron and *Aureolaria pedicularia* are well known in nearby woods, especially south-eastward, while *Polygala sanguinea* is a fairly common plant of open fields. *Kalmia latifolia,* while not a northern species, in the Hudson Valley is mostly confined to the higher elevations to the eastward, and is known about ten miles east of Hudson. *Arisaema Dracontium* grows in marshy woods just above tide-level on Hotaling Island, north of Hudson (McVaugh, # 3136, in N. Y. State herb.); *Physostegia virginiana* has been collected about 15 miles south of Hudson (McVaugh # 2895, in N. Y. State herb.); what is seemingly the coastal-plain species *Polygonatum biflorum* has been found at Blue Hill, town of Livingston, about 4 miles south of Hudson (H. D. House # 22683, in N. Y. State herb.).

If we now consider briefly the application of the above facts to the flora of the next great river valley to the southward, that of the Delaware, we find that of the 38 native plants in Stebbins' list which we are able to discuss carefully, 34 are of frequent or general occurrence in the vicinity of Philadelphia, according to Keller and Brown (3), Stone (7), and Benner (1). *Pterospora Andromedae* and *Gnaphalium decurrens* apparently do not occur near Philadelphia, while *Asplenium montanum* and *Physostegia virginiana* appear somewhat to the westward. The point to be emphasized here is the striking correlation between the rare or interesting plants of the upper Hudson Valley, and the well-known ones of the Delaware Valley. In other words, many plants which are thoroughly at home farther south and nearer the coast, push their way much farther up the Hudson estuary than has been generally recognized.

It is beyond the scope of the present paper to discuss this distribution fully, but a few of the more conspicuous cases are deserving of notice, if only to emphasize the prevailing ignorance on the subject, and the need of further study. Estuarine plants, on the whole, show the most striking distribution, being usually confined to the area of the tide-water, and the present discussion will be restricted to them.

As pointed out recently by Dr. Svenson (9), *Plantago cordata* Lam., known from New York only by old reports at the time of the publication of House's 'Annotated List' (2), occurs in the Hudson Valley. Actually, this species is common, sometimes almost weedy, in rocky coves just above high-tide level, at least as far north as Rensselaer County. Another species mentioned by Dr. Svenson is an *Isoetes,* probably *I. riparia* Engelm., which was then new to New York, so far as known (collections made in September, 1933); the present writer has found what seems to be the same *Isoetes* growing in most of the tidal flats through Columbia County. *Sagittaria subulata* (L.) Buchenau, reported in Gray's Manual as ranging from ' Ct. to Fla., near the coast ', is extremely common on tidal flats throughout the whole length of Columbia County, to at least 125 miles above the mouth of the river; the same applies to *Heteranthera reniformis* R. & P., *Orontium aquaticum* L.; and *Acnida cannabina* L., none of which was known from this area before 1933, except through old reports. The list might be prolonged to a considerable length, but the above is sufficient to indicate that the implications of Stebbins' list of ' interesting ' plants of a century ago were not false ones, and that much field work is yet needed in this neglected region.

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* The species discussed are all represented by specimens in the herbarium of the New York State Museum at Albany.

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The Ranges of our Eastern Parnassias and Sedums[1]

EDGAR T. WHERRY

PARNASSIA

Becoming interested in the soil-reaction relations of members of the genus *Parnassia,* I have during the past few years visited a number of their localities. On attempting to draw up a field key to the species, so as to make sure as to which of them each test was made upon, certain discrepancies in the literature came to light. A report on progress in straightening these out has recently been made in Claytonia,[2] but as that mimeographed journal is not widely available, and as one nomenclatorial change and certain modifications of the key there given seem desirable, this article is being written.

In the case of one species, *P. asarifolia* Vent., no nomenclatorial difficulties appear to have arisen, although its range is inadequately stated in current manuals. Confusion of a second, *P. grandifolia* DC., with other species has sometimes occurred, but its range is given correctly in recent literature. The other two species of the eastern United States have been completely misunderstood as to their geography and nomenclature for over 125 years.

In 1803 Michaux[3] described *Parnassia caroliniana,* giving as its locality " in undis Carolinae." Nine years later Sims[4] applied that species-name to a plant shown by his colored plate to have short staminodia and greenish ovary; this was said, following Michaux, to be " Native of the bogs of North Carolina," although its collector, Masson, is known to have limited his activities to Pennsylvania and more northern states. Pursh,[5] on the other hand, gave *P. caroliniana* as growing from " New York to Virginia," thus actually lumping two quite distinct species,—one occurring in the former, the other, *P. grandifolia,* in the latter—and using for them a name referring to a native of still a third state. This confusion has been perpetuated in all subsequent manuals and floras down to Small's Manual of the Southeastern Flora in 1933.

While the manual just mentioned was in active preparation, a *Parnassia* with large flowers, elongate staminodia, and white ovary was received from Mr. H. A. Rankin, who had collected it in the region termed by Michaux " undae Carolinae," namely, inland from Wilmington, North Carolina. There being no evidence that the quite different plant figured by Sims grows as far south as this state, a change of current nomenclatural usage became inevitable: Michaux's name must be applied to the plant for which it was originally intended,—which had meanwhile been named *P. floridana* by Rydberg.[1] This was duly done by Small[2] and by Alexander,[3] the latter recommending the adoption for the northern species—that figured by Sims—of the name *P. americana* Muhlenberg.[4] Now, this author furnished no description, but gave as the range of his species "Virg. Car. Pens." It therefore comprised at least two species,—for the one which grows in Pennsylvania does not extend even as far south as Virginia, the plant well developed in upland portions of this state and of North Carolina (and represented in his herbarium) being *P. grandifolia,*—and the rules require a name to be rejected if undescribed or if derived from two or more discordant elements. In 1840, however, Rafinesque[5] described several Parnassias, and the features of his *P. glauca* correspond best to those of the plant in question. The four eastern species are, then:

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[1] Contribution from the Botanical Laboratory and Morris Arboretum of the University of Pennsylvania.

[2] Claytonia **1**: 51, 1935.

[3] Flora Bor.-Amer. **1**: 184, 1803.

[4] Curtis's Bot. Mag. **35**: pl. 1459, 1812.

[5] Flora Amer. Sept. **1**: 208, 1814.

SYNOPTICAL KEY TO THE EASTERN PARNASSIAS

- Leaf-blades cuneate, truncate, or subcordate at base; petals sessile.
  - Flowers 3 to 4 cm. in diameter; petals few-veined; staminodium-tips globular; ovary conical, deep green.
    - Staminodia shorter than stamens; soil circumneutral; range, N. J. and Pa. to Ia. and northw. (unknown s. of lat. 40°) .... *P. glauca.*
    - Staminodia longer than stamens; soil circumneutral; range, n. Fla. to La., n. to Mo. and to Va. mts. .... *P. grandifolia.*
  - Flowers 4 to 5 cm. in diameter; petals many-veined; staminodium-tips lanceolate; ovary ellipsoidal, white; soil mediacid; range, Fla. to N. C. .... *P. caroliniana.*
- Leaf-blades cordate; flowers about 4 cm. in diameter; petals clawed; staminodia somewhat shorter than stamens, their tips ovoid-conical; ovary conical, greenish white; soil mediacid; range, Ga. piedm. to Tenn. & Va. mts. & coast .... *P. asarifolia.*

SEDUM

Field studies of the eastern Sedums have led to certain changes in current views as to their classification and distribution, which have been summarized in a recent article in a horticultural journal.[6] The eastern species fall into four of the sections recognized by Praeger[7] and by Berger,[8] which are as follows:

KEY TO SECTIONS INCLUDING EASTERN SEDUMS

- Plants perennial from stout fleshy caudices; follicles erect, at most their beaks spreading.
  - Flowers chiefly perfect; follicle-beaks slender .... § *Telephium.*
  - Flowers in part dioecious; follicle-beaks stout .... § *Rhodiola.*
- Plants perennial from slender stolons, or annual; follicles spreading.
  - Duration perennial; leaves relatively broad; petals white .... § *Seda genuina.*
  - Duration annual; leaves relatively narrow; petals pinkish .... § *Epeteium.*

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[1] N. Amer. Flora **22**: 80, 1905.

[2] Manual SE. Flora: 590, 1933.

[3] Addisonia **18**: 43, 1934.

[4] Catalogus: 33, 1813.

[5] Autikon Botanikon: 42, 1840.

[6] Gard. Chron. Amer. **38**: 264, 1934.

[7] J. Royal Hort. Soc. **46**: 1, 1921.

[8] In Engler & Prantl Nat. Pflanzenfam. ed. 2, **18a**: 438, 1930.

SECTION **Telephium.** One species, *S. telephioides* Michaux.

Praeger and Berger consider this a mere variety of the Eurasian *S. telephium*, but the plants differ in so many respects that I prefer to follow current American usage and keep them distinct. They may be separated thus:

KEY TO TWO MEMBERS OF SEDUM, § TELEPHIUM

Herbage glaucous; leaves mostly opposite or subopposite, short-petioled, few-toothed; petals white to pink; follicles pink, tapering into a spreading beak 1 to 1.5 mm. long; range, Ga. piedm. to s. Pa. mts. .... *S. telephioides.*

Herbage green; leaves mostly alternate, scarcely petioled, often many-toothed; petals dull purple; follicles bronzy, tipped by an abrupt beak barely 1 mm. long; range, escaped throughout ne. U. S., but rarely blooming s. of lat. 42° .... *S. telephium.*

Sedum telephioides has been reported from several stations in western and central New York, but as shown by House [1] most of these refer to *S. roseum.* In the U. S. National Herbarium there is a specimen which seems to represent *S. telephioides* from Clove, Dutchess County, but it may be an escape.

SECTION **Rhodiola.** One species, *S. roseum* (L.) Scop.

The southernmost station for this circumboreal species is usually regarded as one in northern Bucks County, Pennsylvania, the plant of the isolated occurrence on Roan Mountain, North Carolina—Tennessee, 500 miles away, being classed as *S. roanense* Britton. While individual plants of the two may have a dissimilar aspect, specimens can be found in either colony which match the characters of those in the other. The real situation in respect to the supposed differentiating features, leaf-margin, petal-shape, and petal-color, is, then:

Leaves toothed in most plants but entire in an occasional one; petals when carefully dried oblong-lanceolate, but sometimes curling into linear or lanceolate shapes; ground-color of petals green, with bronze coloration extending from the tip ⅓ or sometimes ⅔ the way down; range, s. to Pa. .... *S. roseum.*

Leaves toothed in many plants, but entire in an occasional one, such as that which chanced to be selected as the type; petals when carefully dried oblong-lanceolate, but sometimes curling into lanceolate or linear shapes; ground color of petals green, with bronze coloration extending from the tip ⅔ or sometimes only ⅓ the way down; range, isolated on Roan Mt. .... *S. roanense.*

Should anyone consider these differences of specific rank, they may use the second name. If, however, only varietal distinctness is favored, the second plant may bear the name *S. roseum* var. *roanense* (Britton) Berger. Perhaps they are not separable at all.

SECTION **Seda genuina.** Two species.

Sedum ternatum Michx. is the one eastern species concerning which no taxonomic difficulties have arisen, its broad obovate leaves consistently whorled in threes being highly distinctive. There is merely some question as to the northern limit of its range as a native plant, the stations north of middle Pennsylvania being conceivably escapes from cultivation.

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[1] Annotated List Plts. N. Y.: 376, 1924.

The second eastern member of this section, *S. nevii* Gray, has, on the other hand, been repeatedly confused with *S. pulchellum.* Thus, reports of the latter from Harpers Ferry, [West] Virginia, are based on the occurrence there of the former; and reports of *S. nevii* from Missouri refer, as shown by Palmer and Steyermark,[1] to juvenile *S. pulchellum.* The best evidence at present available indicates the real range of *S. nevii* to be from central Georgia to Alabama, southernmost Illinois, easternmost West Virginia, and central Virginia.

SECTION **Epeteium.** Two species.

The name *Sedum pulchellum* was assigned by Michaux[2] to a species he collected in Tennessee; he gave the locality as Knoxville, but this was presumably a slip for Nashville, as it is abundant around the latter place,—which his journal shows he visited—but unknown much farther east. This plant is a winter annual, but Pursh[3] took it to be a perennial, and horticulturalists use "*pulchellum*" for a perennial species of unknown origin—not, as they suppose, "native to the southern states." Michaux's plant, the only one to which his name properly belongs, ranges from northwestern Georgia to Arkansas, southeastern Kansas, and central Kentucky. *It does not grow in Virginia.*

Material from Georgia distributed by Curtiss has recently been named *Sedum vigilimontis* by Small[4] but I am unable to find any real differentiating characters. When several collections are compared, one obtains these data:

Leaves linear-subterete, when dried under considerable pressure flat-linear; cyme crowded on plants growing in the sun, less so when in the shade or in moist soil; flower-size varying with nutrition: sepals from broadly to narrowly lanceolate, and from 1.5 to 3 mm. in length; petals as much in outline and 3 to 6 mm. in length; and follicles 4 to 8 mm. with beaks 0.5 to 1 mm. in length .... *S. pulchellum.*

Leaves linear-subterete, when dried under light pressure remaining so; cyme rather open when growing in moist places, more crowded in the sun or in dry places; habitat of type station unfavorable, resulting in sepals being rather narrowly lanceolate and little exceeding 2 mm. in length; in petals being also rather narrow and little exceeding 4 mm.; and in the follicles being around 5 mm. long, with correspondingly short beaks .... *S. vigilimontis.*

In other words, plants exhibiting the features of *S. vigilimontis* can be found in the midst of colonies of *S. pulchellum* wherever the environmental conditions are unfavorable, so the former is but an ecological form.

Sedum pusillum Michaux needs little discussion. It has been placed in a separate genus, *Tetrorum*, by Rose,[5] but the slight differences in outline of flower parts and the variation in their number from 4 to 5 are scarcely of generic value. There seems to be general agreement as to its range,—granite ledges from Georgia to North Carolina, although it is rather rare.

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[1] Ann. Missouri Bot. Gard. **22**: 553, 1935.

[2] Flora Bor.-Amer. **1**: 277, 1803.

[3] Flora Amer. Sept. **1**: 324, 1814.

[4] Manual SE. Flora: 587, 1933.

[5] N. Amer. Flora **22, pt. 1**: 59, 1905.

Lophotocarpus spongiosus in Salem County, New Jersey

JOHN M. FOGG, JR.

On October 29, 1934, accompanied by Mr. and Mrs. Joseph W. Adams and Miss Esther L. Larsen, I spent the day collecting along the shore of the Delaware River about two miles southwest of Harrisonville, Salem County. The river front in this locality has been reinforced against tidal action by the erection of a narrow dike which extends northwestward for a distance of about half a mile to the mouth of Mill Creek. At several points the river has broken through the dike, flooding the low-lying area behind it, thus creating a large inland body of water, not shown on any map, which is connected with the river by frequent passages or " breaches ", as they are known locally.

Bordering this inland tidal lake is a broad, flat beach composed of a mixture of mud and sand, which is completely covered at high tide but which supports a meager vegetation, including *Cyperus rivularis* Kunth, *C. filicinus* Vahl, *C. ferax* Rich., *Eleocharis olivacea* Torr., *Peltandra virginica* (L) Kunth, *Juncus acuminatus* Michx., *Acnida cannabina* L. and *Pluchea camphorata* (L.) DC. Associated with these was a plant which, at first sight, we took to be a species of *Sagittaria*, although its very spongy petioles and thick, arcuate pedicels made it seem quite unlike any Arrow-head known to us.

A short distance, probably less than an eighth of a mile, to the southeast we discovered another colony of the same species, now growing, along with *Peltandra*, just above the upper border of the river beach in a shallow muddy depression which must be inundated at times of unusually high tide. At both localities the plants had suffered somewhat from the effects of early frosts, but we were able to collect a representative series of specimens.

The following day, when I described our find to Mr. Bayard Long, he at once suggested that it might be *Lophotocarpus spongiosus*, a diagnosis which he later definitely confirmed upon being shown our material.

A few days afterward (November 5, 1934) Long and I visited the same region for the purpose of taking photographs and collecting additional specimens. On this occasion we investigated the mouth of a broad slough which, starting near the second *Lophotocarpus* station described above, extended inland across a wide area of tidal marsh. The vegetation of the marsh was largely composed of a tall growth of *Spartina cynosuroides* (L.) Roth, but the soft wet mud of the drainage slough which traversed it was characterized by the presence of *Peltandra virginica*, scattered among which were growing countless plants of *Lophotocarpus*. We had no means of estimating the extent of this miry drainage belt, for it was in many places too deeply submerged to invite thorough exploration, but it followed a winding course off across the marshland and, as far as our eyes could see, was occupied by a nearly solid growth of *Peltandra* and *Lophotocarpus*.

Nearly a year later (October 8, 1935) I revisited the locality and succeeded in crossing the marshes for a distance of perhaps an eighth of a mile. Upon this occasion the water level was not so high as it had been the preceding autumn and *Lophotocarpus* was observed to be restricted to the lower and more submerged areas. That the colony must indeed be a considerable one was indicated by the fact that beyond the farthest point to which I penetrated the plants might be seen to continue in undiminished numbers.

Lophotocarpus spongiosus (Engelm.) J. G. Smith is a species of tidal shores and brackish muds along the Atlantic coast of North America from New Brunswick to Virginia. It has been definitely known within the Philadelphia local area only from New Castle County, Delaware, where, between 1866 and 1894, it was collected at several localities along the Delaware River (Cherry Island, Wilmington and Delaware City). The herbarium of the Philadelphia Botanical Club contains 10 sheets from the above stations collected by Commons, Martindale, Canby and Tatnall.

All previous references to the occurrence of *Lophotocarpus* in southern New Jersey appear to be unsubstantiated. In Britton's Catalogue[1] the plant (as *Sagittaria calycina* Engelm., var. *spongiosa* Engelm.) is credited to Camden County, New Jersey, on the authority of C. F. Parker, who is supposed to have collected it in tidal mud along the Delaware River. Dr. Witmer Stone has disposed of this record, however, by insisting that it was actually based upon material of a submerged form of *Sagittaria graminea* Michx.[2] Our collections from Harrisonville, therefore, appear to constitute the first basis for admitting *Lophotocarpus spongiosus* to the flora of southern New Jersey. The following specimens are being deposited in the herbaria of the Philadelphia Botanical Club, University of Pennsylvania or the Gray Herbarium: Adams, Nos. 1743, 1745, 1746, 1747; Long, No. 45,271; Fogg, Nos. 7854, 10,003, 10,004.

It is of interest to note that Miss Larsen herself added another station to those already known from New Castle County, Delaware, when, on July 20, 1934, she discovered the plant on the northeast side of Pea Patch Island (Larsen No. 867). This was apparently the first time in forty years that *Lophotocarpus* had been collected in Delaware. Pea Patch Island, it may be observed, is situated in the Delaware River almost due west of our Harrisonville station.

UNIVERSITY OF PENNSYLVANIA.

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[1] Britton, Cat. Plants N. J. 256 (1889).

[2] Stone, Plants Southern N. J. 169 (1911).

Conium maculatum in the Brandywine Valley

R. R. TATNALL

In Delaware the true hemlock, *Conium maculatum* L., has been regarded as a rare species. The herbarium of the Society of Natural History, at Wilmington, contains three specimens of this introduced plant from this state, and there are three at the Academy of Natural Sciences, all collected between 1896 and 1902, and all occurring in or near the city of Wilmington. The collectors were W. M. Canby, E. Tatnall and A. Commons. No later collections from Delaware appear to be on record. For some years the writer has been on the lookout for the plant, at the sites of the older collections and elsewhere, without success.

However, on June 6, 1935, I noticed a small patch of it in a meadow along the Brandywine Creek, above Wilmington. During the next few days countless colonies burst into bloom in the low grounds along the stream. Nearly every meadow low enough to be reached by high water in times of flood was more or less thickly sprinkled with *Conium* plants. In many places veritable thickets were formed, too dense to be penetrated without breaking down many plants. This profusion was in evidence from just above tide-water to the State line, and thence for some miles on up into Pennsylvania. Individual specimens attained a height of 5 or 6 feet, and seen from a distance suggested Christmas trees trimmed with white decorations, the plants being thickly clothed with umbels from the lowest branches to the top.

Upon reporting the above facts at the Academy, I learned that a small colony of *Conium* upstream in Chester County, Pennsylvania, has been known for some years. My informant, Mr. A. N. Leeds, recalled that in 1933, at about the time the seeds were maturing, a flood occurred in the Brandywine, due to heavy rains, and that the *Conium* was flattened to the ground by the water. It would seem likely that seed was washed down-stream, lodging in the flooded meadows. As biennials, the plants would pass the next season in an inconspicuous form, perhaps as rosettes, ready to burst into bloom the following summer. This, however, does not explain occasional plants seen on the higher banks, quite out of reach of flood water, nor does it explain a strong colony which appeared in a vacant city lot, more than a mile from the Brandywine.

WILMINGTON DEL.

A Study of the Plant-Collections made by Frederick Pursh during a Trip to New York and Vermont in the year 1807

ROGERS MCVAUGH

One of the most important early works devoted to North American systematic botany was the "Flora Americae Septentrionalis"[1] of Frederick Pursh, published in London in 1814. This work was in English, and was the result of nearly fifteen years of study by the author, both in the field and in the herbarium. Pursh himself was a gardener, educated in Dresden, and came to the United States in 1799. He spent the years 1799-1811 in this country, and while here made the acquaintance of most of the botanists of the time, and had opportunity to study their collections.[2] His own travels were extensive, although confined to the eastern part of the country.[3] In 1811 Pursh went to England, where, under the patronage of A. B. Lambert, he completed the Flora; he had access to all the important earlier collections preserved there, and was thus able to bring together most of the facts then known concerning American botany.

While at Philadelphia, working as gardener at the estate of William Hamilton[4] Pursh was befriended by Benjamin S. Barton, then Professor of Botany at the University of Pennsylvania. Professor Barton encouraged him in his botanical studies, and assisted him to make two trips; the first, in the summer of 1806, south to Virginia and North Carolina, and the second, a year later, north to New York and Vermont.

As recorded by Pennell, there are preserved in Professor Barton's herbarium about 1150 specimens collected by Pursh, either on one of these two trips, or in the vicinity of Philadelphia. The bulk of these (nearly 900) were gathered during the southern trip of 1806, and have received little attention from botanists. The present paper is an attempt to place on record the plants collected during the northern trip of 1807, and now preserved for the American Philosophical Society at the Academy of Natural Sciences of Philadelphia. There are about 150 of these, bearing usually some data as to locality and habitat; the earlier ones are dated. The identifications made by Pursh seem to be wholly field determinations, made on the spot, often by guesswork. The main value attaching to these collections seems to be that they represent in several cases the first records of various species from the region.[5] This is especially true in regard to the peculiar salt-marsh flora of central New York.

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[1] Pursh, F. "Flora Americae Septentrionalis; or, A systematic arrangement and description of the plants of North America. Etc.". 2 vols. London, 1814.

[2] Pursh, l.c. 1: preface, pp. v-xv.

[3] Pennell, F. W. "The elder Barton—his plant-collection and the mystery of his floras." *Bartonia* no. 9: 22–24. 1925–26.

[4] "Woodlands"; the present site of the Woodlands Cemetery, with the entrance at 39th St. and Woodland Ave.

There are no specimens extant from the first part of the journey, but luckily Pursh's journal[6] of the whole trip has been preserved, so that we are able to follow him in detail, and to supplement the somewhat sketchy data furnished with the plants themselves. The journey was begun from Philadelphia by stage to Easton, May 27, 1807. From Easton the botanist travelled up and down the Delaware River, visiting the Water Gap, and eventually ascending the river to the great bend near the present Port Jervis. He then returned to the Gap, and on June 11 started on foot over the Pocono Mountains, which he crossed in five days, arriving at Wilkes Barre late in the evening of June 16. Leaving Wilkes Barre, Pursh made his way up the Susquehanna River, crossing Tunkhannock Creek and then leaving the Susquehanna to stop at Hop Bottom with a Mr. Millbourne. After a few days stay here, travel was resumed; the plan was to strike due north, meeting the Susquehanna again in its upper reaches, where it first dips into Pennsylvania before turning back into New York. This plan was carried out; the road then led down the river into Pennsylvania again, to " Tyoga Point ", at the mouth of Cayuta Creek, which was reached on July 3. Thus far our knowledge of the trip is derived wholly from the journal; no specimens are preserved, although the writer mentions preparing collections to send to Dr. Barton.

During the period July 4—August 18 each plant collected bears the exact date. These collections were made mostly in the vicinity of Onondaga Lake, N.Y., with a few from a short trip to Oswego, at the eastern end of Lake Ontario. Pursh made his headquarters at " Onodago ", the present Onondaga Hill, southwest of Syracuse, until August 28; his journal for that day says, " Having inclosed specimens, seeds and minerals in a good box which I left to the care of Mr. Geddes I settled my bill here, & in the evening went off with the stage which only goes about 7 m. further on from here ".

After his departure from Onondaga his route led eastward across New York through Utica, Johnstown, Ballston Spa and Saratoga, Glens Falls and Whitehall, New York to Rutland, Vermont,[7] which was reached on September 8. After a stay of over two weeks in and around Rutland, during which time he was much bothered by illness, the traveller started his return journey on September 24; he went through Troy and Albany and down the Hudson River to New York, whence passage was engaged to Philadelphia by packet.

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[5] I think that yet greater interest attaches to these specimens as standing for the species that Pursh claims to have known living, those marked " v. v." in his Flora. A rapid survey indicates about 30 that he could only have seen on the excursion of 1807; of these 15 are in the series at the Academy, leaving as many more unrepresented. The explanation of their absence, and of the smallness of the series of 1807 as compared with that of 1806 is that Pursh presumably took much of the later collection to England for further study, an inference that well accounts for the absence of plants so remarkable as *Scolopendrium* and *Isoetes*. —EDITOR.

[6] Pursh, F. " Journal of a Botanical Excursion in the northeastern parts of the states of Pennsylvania and New York ". Philadelphia, 1866. Reprinted in 1923 by the Onondaga Historical Association; the reprint differs from the original in having corrected spelling and grammar.

[7] The plants collected by Pursh in Vermont have also been studied by Mr. W. W. Eggleston, who seems to have never published any account of them.

The trip thus ended at midnight on October 5, after an absence of over four months. The specimens which were collected after Pursh's departure from Onondaga bear no date except the year, 1807. They were apparently brought back by him in person, and not sent to Prof. Barton by messenger, as his earlier ones had been. The dates assigned in the present paper to the plants from this latter part of the trip are taken from the references in the journal.

In the following list an attempt has been made to arrange the collections chronologically, as well as by localities. The dates given are those on the labels, except as indicated above. The localities are also taken directly from the labels, as are the habitat data, if any. Pursh's determinations are given in parentheses. The modern place-names in the Onondaga Lake region have been checked through the kindness of Dr. Homer D. House. The nomenclature here used follows that of Wiegand and Eames[8] wherever possible; the most notable exceptions to this are in the use of the names *Dryopteris* (for *Thelypteris*), and *Potamogeton spirillus* Tuckerm.[9]

Part II. LIST OF SPECIMENS IN THE BARTON HERBARIUM FROM PURSH'S NORTHERN TRIP OF THE YEAR 1807.

July 4, 1807. Tyoga Point.	
Heracleum lanatum Mx.	(Heracleum lanatum)
July 9, 1807. Along fences on the road to the Owasco Lake.	
Conium maculatum L.	(Conium maculatum?)
July 9, 1807. On the road to Owasco Lake.	
Ulmus fulva Mx.	(Morus ?)
July 9, 1807. Near Owasco Lake.	
Ostrya virginiana (Mill.) Koch	(Carpinus hispidus P. Ostrya Mx.)
July 11, 1807. Onondaga.	
Scirpus atrovirens Muhl.	(Scirpus)
Scirpus americanus Pers.	(Scirpus dichotoma)
Anemone canadensis L.	(Anemone)
Brassica Napus L. ?—old fruit only.	(Brassica)
July 13, 1807. Onondaga.	
Apocynum cannabinum L.	(Apocynum Cannabinum)
Asclepias phytolaccoides Pursh	(Asclepias multiumbellata P.)

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[8] Wiegand, K. M., and Eames, A. J. "The flora of the Cayuga Lake Basin, New York. Vascular Plants". Cornell Univ. Agric. Exper. Station Memoir 92. Ithaca, N. Y., May 1926.

[9] See Fernald, M. L., Mem. Amer. Acad. of Arts and Sci. 17: part 1, July 1932. "The linear-leaved North American species of Potamogeton, Section Axillares".

Triosteum perfoliatum L., var. *aurantiacum* (Bickn.) Wieg. —probably, though only middle leaves are present.	(Triosteum majus)
July 13, 1807. Onondaga, on the road to Mr. Geddes's.	
Chenopodium capitatum (L.) Asch.	(Blitum virgatum)
July 13, 1807. Onondaga, Mr. Geddis's Saw mill.	
Thalictrum polygamum Muhl.	(Thalictrum dioicum mas & femina)
Potentilla norvegica L., var. *hirsuta* (Mx.) Lehm.	(Potentilla hirta ?)
Verbena hastata L.	(Verbena hastata)
July 14, 1807. Onondaga.	
Sanicula trifoliata Bickn.	(Sanicula marylandica ? an distinctum ?)
July 15, 1807. Onondaga Creek, Onondaga Hollow.	
Potamogeton spirillus Tuckerm ? —leaves only.	(Potamogeton marinum ?)
July 15, 1807. Onondaga, on the road to Mr. Geddes's.	
Chenopodium Botrys L.	(Chenopodium Botrys)
July 15, 1807. Onondaga, Mr. Geddis's Saw mill.	
Chara sp. ?	(Chara)
July 16, 1807. Onondaga Salt Springs.	
Triglochin palustris L.	(Triglochin palustre)
Sagittaria cuneata Sheldon	(Sagittaria spec.)
Alisma Plantago-aquatica L.	(Alisma Plantago)
Scirpus validus Vahl.	(Scirpus lacustris)
Ranunculus Cymbalaria Pursh	(Ranunculus stoloniferus L.)
Lathyrus palustris L., var. *myrtifolius* (Muhl.) Gray	(Lathyrus spec.)
Hibiscus Moscheutos L.	(Hibiscus palustris ? or Moscheutos)
Epilobium angustifolium L.	(Epilobium angustifol.)
Lysimachia terrestris (L.) BSP.	(Lysimachia racemosa)
Scutellaria epilobiifolia Hamil.	(Scutellaria galericulata ?)
Utricularia vulgaris L., var. *americana* Gray	(Utricularia minor ?)
Galium boreale L.	(Galium f. quaternis, linearis, corollis 3-fid; 3-andris)
Campanula uliginosa Rydb.	(Campanula erinoides ?)
July 16, 1807. Onondaga Salt Marshes.	
Sparganium eurycarpum Engelm.	(Sparganium ramosum)
Poa palustris L.	(Poa)
Spartina Michauxiana Hitchc.	(————)
Scirpus fluviatilis (Torr.) Gray ? —immature inflorescence.	(Trachynotia ?)
Rumex verticillatus L. ?—young fruit.	(Rumex polygonoides L.)
Asclepias incarnata L.	(Asclepias incarnata ?)

Convolvulus sepium L. —more or less pubescent at base of leaves.	(Convolvulus sagittatus fl. rosea stigma capitatum, Ipomoea spec: !)
July 16, 1807. Onondaga.	
Pyrola rotundifolia L., var. *americana* (Sweet) Fernald	(Pyrola rotundifol.)
July 18, 1807. Onondaga Salt Springs.	
Galium trifidum L.	(Galium)
July 18, 1807. Onondaga.	
Athyrium angustifolium (Mx.) Milde	(Asplenium polypodioides)
Athyrium acrostichoides (Sw.) Diels	(Nephrodium dentatum)
Dryopteris intermedia (Muhl.) Gray	(——————[10])
Cornus alternifolia L. f.	(Cornus alternifolia: White Osier, Dog agrium)
Lithospermum latifolium Mx.	(Batschia parviflora P.)
Hackelia virginiana (L.) Johnston	(Cynoglossum parviflorum)
Monarda didyma L.—leaves only.	(Pycnanthemum)
Phryma leptostachya L.	(Phryma Leptostachia)
Heliopsis helianthoides (L.) Sweet	(Buphthalmum helianthoides)
July 20, 1807. Onondaga.	
Dryopteris Linneana C. Chr.	(Nephrodium Dryopteris)
Thuja occidentalis L.	(Cupressus thyoides)
Taxus canadensis Marsh.[11]	(Taxus baccata)
Laportea canadensis (L.) Gaud.	(Urtica or Boehmeria)
Actaea alba (L.) Mill.—young fruit only.	(Actaea spicata Red Cohosh)
Chrysosplenium americanum Schwein. ? —leaves only.	(Chrysosplenium oppositifol.)
Geum strictum Ait. ?—flowers only.	(Ranunculus geoides P.)
Galium triflorum Mx.	(Galium flore sulphureo s. senis)
Lonicera dioica L.	(Lonicera glauca)
Lonicera canadensis Marsh.	(Xylosteum tartaricum)
July 21, 1807. Onondaga.	
Salix discolor Muhl.	(Salix)
Potentilla norvegica L., var. *hirsuta* (Mx.) Lehm.	(Potentilla)
July 21, 1807. Onondaga Lake.	
Potentilla Anserina L.	(Potentilla Anserina)
Cornus Amomum Mill.	(Cornus an Albida)
Stachys tenuifolia Willd., var. *aspera* (Mx.) Fernald	(Stachys)
Teucrium occidentale Gray	(Teucrium canadense)
Viburnum Opulus L., var. *americanum* Ait.	(Viburnum Opulus. Tree Cranberry)
Viburnum acerifolium L.[12]	

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[10] No label in Pursh's hand; a later label says "Onondaga, July 18, 1807".

[11] "Rocks near Mr. Geddes's"

[12] Young leaves of what is apparently this species are mounted on the sheet with *V. Opulus*.

July 25, 1807. Onondaga Lake.	
Potamogeton sp. ?—immature floating leaves only.	(Potamogeton lucens ?)
Salix Bebbiana Sarg. ?—leaf fragment only.	(Populus candicans)
Sonchus asper (L.) Hill	(Sonchus. Richweed of Virginia)
Erechtites hieracifolia (L.) Raf.[13]	
July 30, 1807. Seneca River.	
Crataegus punctata Jacq.[14]	(Crataegus)
July 31, 1807. Lake Ontario.	
Salix Bebbiana Sarg.	(Salix)
Crataegus Crus-galli L.[15]	(Crataegus)
Vaccinium corymbosum L. ?—leaves only.	(Vaccinium)
July 31, 1807. Oswego.	
Solidago canadensis L.	(Solidago)
August 1, 1807. Oswego.	
Malva rotundifolia L.	(Malva rotundifolia ?)
August 1, 1807. Oswego River.	
Polygonum amphibium L. ?—leaves only.	(Polygonum amphibium)
August 2, 1807. Oswego River.	
Potamogeton spirillus Tuckerm. ? —leaves only.	(Potamogeton marinum)
Myriophyllum verticillatum L., var. *pectinatum* Wallr.	(Potamogeton pectinatum P.)
August 2, 1807. Oswego Falls.	
Potamogeton Richardsonii (Benn.) Rydb. ?[16]	(Potamogeton crispum P.)
Silene noctiflora L.	(Silene)
August 2, 1807. Onondaga Hollow.	
Populus balsamifera L.—sprout leaves.	(Populus grandidentata)
August 4, 1807. Seneca River.	
Zizania aquatica L.[17]	(Zizania clavellata ? Wild Rice)
August 9, 1807. Onondaga.	
Andropogon furcatus Muhl.	(Andropogon. very high)
Urtica gracilis Ait.	(Urtica procera L.)
Monarda fistulosa L.	(Monarda fistulosa ?)
August 10, 1807. Onondaga.	
Salix discolor Muhl.	(Salix)
August 12, 1807. Pompey Hill.	
Cirsium discolor (Muhl.) Spreng.	(Carduus)

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[13] Leaves only, mounted with *Sonchus*.

[14] Fide W. W. Eggleston.

[15] Fide T. Meehan.

[16] In flower. This sheet also bears flowering plants of *P. lucens* L. ?

[17] The broad-leaved plant; *Z. palustris*, according to some.

August 13, 1807. Pompey Hill.	
Geum sp.—leaf fragment only.	(Geum. flore luteo)
August 18, 1807. Onondaga Lake.	
Lobelia Kalmii L.	(Lobelia Kalmii)
September 1, 1807. Stone Arabia.	
Galeopsis Tetrahit L.	(Galeopsis)
September 1, 1807. near Johnstown.	
Dryopteris Thelypteris (L.) Gray	(Nephrodium)
Mitella nuda L.	
September 3, 1807. Saratoga.	
Salix lucida Muhl.	(Salix)
Prunus pennsylvanica L. f.—leaves only.	(Prunus)
Spiraea latifolia Borkh.	(Spiraea salicifolia)
Conium maculatum L. ?—old fruits only.	(Conium maculatum)
Eupatorium Bruneri Gray [18]	(Eupatorium maculatum)
Helianthus decapetalus L.	(Helianthus)
September 5, 1807. Glenns Falls on the Mohock.	
Juniperus communis L. var. *depressa* Pursh—leaves only.	(Juniperus)
Amelanchier sanguinea (Pursh) DC.[19]	(Unknown)
Rhus canadensis Marsh.	(Rhus)
Campanula rotundifolia L.	(Campanula rotundifolia)
Solidago racemosa Greene [20]	(Solidago)
September 7, 1807. Skeansborough.	
Sorghastrum nutans (L.) Nash	(Andropogon)
Cyperus aristatus Rottb.	(Cyperus)
Cyperus diandrus Torr.	(Cyperus)
Cyperus esculentus L. ?—flowers only.	(Cyperus)
Eleocharis acicularis (L.) R. & S.[21]	
Euphorbia platyphylla L.	(Euphorbia)
September 8, 1807. Fairhaven.	
Salix Bebbiana Sarg.[22]	(Salix)
September 9, 1807. Rutland.	
Cirsium discolor (Muhl.) Spreng.	(Carduus. Canada Thistle)
September 11, 1807. Greenmountain.	
Equisetum scirpoides Mx.[23]	(Equisetum scirpoides Mx.)
Chiogenes hispidula (L.) T. & G.	(Vaccinium hispidulum)
Aster divaricatus L.	(Aster flexuosus P.)
Aster acuminatus Mx.	(Aster surculosus)
September 12, 1807. Rutland.	
Artemisia vulgaris L.	(Artemisia)

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[18] See Mackenzie, K. K., in *Rhodora* 22: 157–165. 1920.

[19] *A. rotundifolia* Roem., fide M. L. Fernald.

[20] Fide W. W. Eggleston. Two sheets; both apparently near *S. Randii* (Porter) Britton.

[21] One fruiting spike on sheet with the last.

[22] Fide M. L. Fernald.

[23] "Roots of trees".

September 14, 1807. Meets Falls near Rutland[24]

Quercus alba L.	(Quercus)
Hamamelis virginiana L.	(Hamamelis virginiana)
Prunus pennsylvanica L. f.—leaves only.	(Prunus)
Nemopanthus mucronata (L.) Trel.	(Ilex canadensis)
Viola arenaria DC.[25]	(Viola debilis)
Vaccinium sp.—leaves only.	(Vaccinium)

September 18, 1807. Greenmountain.

Nemopanthus mucronata (L.) Trel.	(Ilex canadensis)
Aralia hispida Vent.	(Aralia hispida)
Epifagus virginiana (L.) Bart.	(Orobanche virginiana)

September 25, 1807. Tinmouth.

Populus tremuloides Mx.	(Betula)

The following are undated, and unmentioned in the Journal; they were collected at Rutland between Sept. 8 and 24:

Salix discolor Muhl.[26]	(Salix)
Betula papyrifera Marsh. ?—leaves only.	(Betula)
Quercus ilicifolia Wang.	(Quercus Banisteri)
Polygonum lapathifolium L.	(Polygonum)
Gentiana clausa Raf. ?	(Gentiana Saponaria)
Helianthus decapetalus L.	(Helianthus)

The following were not mentioned in the Journal, are labelled "Greenmountain", and were collected between Sept. 8 and 24:

Thuja occidentalis L.	(Thuya)
Ostrya virginiana (Mill.) Koch ? —leaves only.	(Betula)
Fraxinus americana L. ?—leaves only.	(Fraxinus)
Galium asprellum Mx.	(Galium)
Aster lateriflorus (L.) Britt.	(Aster)

The following is labelled "Cattskill mountain, 1807":

Chenopodium hybridum L.[27]	(Chenopodium)

In addition, there are the following without definite locality:

Solidago serotina Ait.	(Solidago, Vermont)
Anaphalis margaritacea (L.) B. & H.	(Gnaphalium. Lake Ontario, Vermont, lake Champlain)
Bidens connata Muhl.	(Coreopsis. Common in New York and Vermont)

Finally, the collection contains the following without labels of any sort:

Scirpus fluviatilis (Torr) Gray ?
—flowers only.
Dalibarda repens L.
Cornus canadensis L.
Vaccinium stamineum L.

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[24] Meades Falls, Center Rutland, Vt., fide W. W. Eggleston.

[25] Fide Ezra Brainerd.

[26] Fide M. L. Fernald.

[27] On p. 198 of Pursh's *Flora, Chenopodium hybridum* is recorded: "In wet rocky situations: on the North river near Catskill, New York. . .". As Pursh is known to have passed through Catskill on his way down the Hudson in 1807, this plant may well have been collected here, Sep. 28, 1807.

Part III. List of localities cited in the Pursh Collection, with the probable modern equivalents.

Tyoga Point	near Sayre, Bradford Co., Penna.
Owasco Lake	Cayuga Co., N. Y.
Onondaga	Onondaga Hill, Onondaga Co., N. Y.
Onondaga, on the road to Mr. Geddes's; Mr. Geddis's Saw mill, etc.	Onondaga Co., N. Y., 4–5 mi. WSW of Syracuse.
Onondaga Hollow	Onondaga Valley, Onondaga Co., N. Y.
Onondaga Salt Springs, Onondaga Salt Marshes	south and east of Onondaga Lake.
Onondaga Lake	Onondaga County, N. Y.
Seneca River, Oswego River, Oswego Falls	Onondaga or Oswego Co., N. Y.
Oswego	Oswego Co., N. Y.
Pompey Hill	Pompey, Onondaga Co., N. Y.
Stone Arabia	Montgomery Co., N. Y.
Johnstown	Fulton Co., N. Y.
Saratoga	Saratoga Co., N. Y.
Glenns Falls on the Mohock	Glens Falls, Warren Co., N. Y.
Skeansborough	Whitehall, Washington Co., N. Y.
Fairhaven	Rutland Co., Vt.
Greenmountain	vicinity of Rutland, Vt.
Rutland	Rutland Co., Vt.
Meets Falls near Rutland	Meades Falls, Center Rutland, Vt.
Tinmouth	Rutland Co., Vt.

Elias Durand and his Association with the Academy of Natural Sciences of Philadelphia

FRANCIS W. PENNELL

During the middle decades of the nineteenth century, after the departure of Thomas Nuttall to England in 1840 and before the beginning of John H. Redfield's curatorial labors in 1876, the herbarium of the Academy of Natural Sciences grew but little. The great days of Nuttall and Schweinitz were over, and though William Darlington was still active in Chester County, Pennsylvania, it was no longer with the keenly discriminative judgment of his earlier work. The taxonomic problems of the flowering plants and ferns of the eastern United States had now been happily solved by the superior critical insight of John Torrey and yet more by the unerring genius of Asa Gray. So thought the botanically interested of that day, among whom was Elias Durand, druggist, of Philadelphia, whose interest in the Academy's plant-collections covered nearly this entire period.

Durand's life has been sketched for us in an obituary notice[1] prepared by Thomas Meehan. Born in Mayenne, France in 1794, the youngest of fourteen children, he studied under a distinguished pharmacist and from the autumn of 1812 attended scientific lectures in Paris, hearing Gay-Lussac, Thinard and other notable men. Commissioned an assistant pharmacist, he joined the French army, becoming a zealous adherent of Napoleon, leaving the army on Napoleon's downfall, but returning again to share the Hundred Days. After Waterloo he escaped to the United States, reaching New York in 1816. Following some unsuccessful business ventures, he became a pharmacist in Baltimore, and then in 1825 opened a store in Philadelphia at the southwest corner of Sixth and Chestnut streets. This became a gathering place of those interested in pharmacy and botany, while its proprietor became increasingly known by his scientific papers in both these fields. In 1852 he retired from business so as to devote his remaining years to botanical work.

The chief botanical papers by Elias Durand were written after this date. They are mostly studies of special collections that had come to the Academy of Natural Sciences. " Plantae Heermanianae " (1855) reported the plants gathered by Dr. A. L. Heerman on Lieutenant Williamson's survey of 1852 for a southern route for a Pacific railroad; " Plantae Prattenianae Californicae " (1855) those gathered in California by Henry Pratten in 1851; and " Plantae Kaneanae Groenlandicae " (1854) those of Dr. E. K. Kane on two Arctic expeditions. These, as well as sketches of Nuttall and the younger Michaux, all appeared in publications of the Academy, while an account of the vegetation of the Great Salt Lake country was published in the Transactions of the American Philosophical Society for 1859. His taxonomic studies show Durand's care and conservatism.

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[1] Proc. Acad. Nat. Sci. Phila. 25: 355–359. 1873.

Durand's later work was accomplished at the Academy of Natural Sciences and our special interest lies in tracing his association with and interest in its herbarium. He early contributed specimens thereto, as the Academy's " Handbook to the Museum " of 1837 credits him with 925 species presented before that date and 18 more added in that year. The year 1837 was in the decade of the most active growth of the Academy's herbarium, when it might well have been accounted first among the plant-collections of the United States. Probably, with the passing of the old enthusiasm at the Academy and also with a growing interest in building up his own herbarium,[2] Durand's contributions to the Academy's herbarium became very few until the time arrived when its continuance and very preservation seemed to devolve especially upon him.

During the early years of his retirement from business much of Durand's time was given to carrying out his special policy for organizing the Academy's herbarium. Bundles and portfolios of specimens had long been accumulating from many collectors and many parts of the world. As these specimens were unmounted and their consultation in that state was necessarily arduous, Durand undertook to simplify the situation by sorting out a special North American series of specimens. For this he prepared a special " Index of the families and genera contained in the Herbarium Boreali-Americanum ", dated March, 1858. His own account of the formation of this special herbarium exists in a slightly earlier letter [3] to the Academy's Curators:

> " Dear Sirs: The *Herbarium Boreali Americanum,* upon which I have been engaged for these four years, is now nearly completed. As far as it goes, it fills up more than sixty [4] large portfolios.
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> " In its formation, I have followed the arrangement of De Candolle, and have just finished the order *Gramineae,* which is the last of the phaenogamous plants. The number of *described* species therein contained amounts to seven thousand two hundred and forty-two, of which 5993 are dicotyledonous, and 1248 monocotyledonous species. It contains, moreover, other plants, either new or as yet unpublished, which may, in all probability, raise the whole number of phaenogamous species of this particular collection to eight thousand. When the cryptogams have been added to these, it will form a mass of not less than ten thousand North American plants, constituting one of the most complete Herbaria extant.
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> " This special North American herbarium had become an essential desideratum in an Institution like ours, particularly devoted to the natural wealth of the country. In times past, it was inconvenient and difficult to the student of the botany of North America to search in the general herbarium, among a

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[2] For account of this see Durand's own statement quoted in the succeeding article.

[3] Handbook to the Museum of the Academy of Natural Sciences of Philadelphia. Edited by J. H. Slack, M.D. Philadelphia, 1862, (p. 83).

[4] Apparently 59 portfolios, as shown by the highest volume-number to which he refers in his Index.

mass of forty-six thousand species from all parts of the world, for the particular native plants which he was desirous to examine. Now this work is rendered easy, and he may at once, and without trouble or interruption, examine a whole suite of American species of the same genus or of the same order.

" The *Herbarium Boreali Americanum,* as far as it reaches, has been made up from the numerous packages of specimens transmitted to the Academy of Natural Sciences from all parts of the country, and piled up, neglected, on the shelves of the botanical room. It is highly indebted to the valuable private collections of Major Le Conte, and of the late Messrs. Conrad and James Read, and to the partial invoices of Drs. Torrey, Gray, Engelmann, Short, and others. From my own herbarium I have selected for it more than fifteen hundred rare and frequently unique specimens of my collection, all from Texas, New Mexico, the Northwestern Territories, Oregon, and California. The whole number of species contained in this new botanical treasure is at least double that which is to be found scattered in our general herbarium.

" I do not vouch for a complete accuracy of names, but I have performed my task to the best of my ability. If faulty in some rare instances, it remains open to correction by those who will follow me. If it possesses other defects, one is that, in many cases, it is overstocked with duplicates; but this I intend to obviate hereafter, by abstracting the superfluity with a view to enrich the general herbarium, or to store up duplicates for exchange.

" The great merit of this collection of North American plants is that it possesses a large number of authentic specimens—almost all the plants of Mr. Nuttall, and many others from Messrs. Elliott, Baldwin, Pursh, Torrey, Asa Gray, Curtis, &c.

" With regard, your most obedient servant,

E. DURAND

PHILADELPHIA, December 17, 1857."

It is difficult for botanists of the present period, with our questioning of old conclusions and our insistence upon field-judgments and knowledge of distribution in deciding specific limits, to realize the confidence of workers eighty years ago. Durand could feel that only " in some rare instances " did his identifications lie open to correction by future botanists,—an assurance that he doubtless believed was soundly based upon the finality of the decisions of Torrey and Gray. At this distance of time we can equally appreciate the marvellous work of those masters, but we must feel too a regret that, instead of treating their utterances as oracular, men like Darlington and Durand were not rather kindled thereby to similar critical activity.

Durand's allusion to " duplicates " must not be confounded with our more modern use of this word. He meant additional specimens of a species. Eighty years ago he felt that there were too many of these, and of course, in the unmounted condition of that time, with all the specimens of a species placed loose within the same doubled sheet of paper, these folders would tend to become unwieldy. What strikes us is the unconcern about these additional specimens as evidence for a species' distribution. His suggestion of using some of this superfluous material as exchanges (this word clearly in its modern sense!) makes us wonder how many of the earlier collections may have left the Academy in this way. Presumably Durand did undertake the proposed work of abstracting these unneeded specimens, and this sequel may well explain why certain old collections can not be found in the Academy's herbarium to-day.

But how do we know that unmounted specimens of different collectors were likely to have been placed together by Durand? He does not tell us so, and no other detailed account of the Academy's " Herbarium Boreali-Americanum " appears to have survived. No portion of this herbarium has persisted in that form, since the later mounting of fragile plant-specimens upon firm sheets of paper has enabled the easy handling of large quantities of material. But there has survived at the Academy an ample illustration of Durand's method in the boxes of the Short Herbarium, containing specimens as yet unmounted.

Charles Wilkins Short was a prominent medical professor and physician of Kentucky. Botany was his keen avocation, and in it his energies were devoted almost wholly to the assembling of a great herbarium. On his death in 1863 this devolved by his will to the Smithsonian Institution at Washington, D. C.[5] At that time, perhaps due in great measure to conditions during the Civil War, the trustees of the Smithsonian Institution could not accept the gift because they had no space that could accommodate so large a plant-collection—a decision that has a touch of humor in the fact that subsequently they did establish an herbarium which has in time become the largest in the New World. Through Dr. Gray's friendly intervention [6] it was then offered to the Academy of Natural Sciences of Philadelphia, by whom it was gratefully accepted, becoming the possession of the Academy in 1864. To its organization Durand immediately gave his attention, preparing two synopses of its families and genera: " Index to Dr. Short's Herbarium (N. American & European)[7], and " Index to Dr. Short's Equatorial Herbarium, containing collections of the West-India Islands & Central America ". These synopses follow each other in the same manuscript book, while a pencilled memorandum states that " Short's Herbarium contains about 1700 genera " (clearly meaning his North American and European series) and " Equinoctial Herbarium contains 1072 genera ". This manuscript book is introduced by the following:

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[5] See page 20 of S. D. Gross, Biographical Sketch of Charles Wilkins Short, M.D. Philadelphia, 1865.

[6] See Report of Botanical Committee for 1864, in Proc. Acad. Nat. Sci. Phila. 16: 291. 1864.

[7] Supplied with an actual index, called " Alphabetical Table of the Natural Orders ".

> "Note. Dr. Short's herbarium was arranged according to a Linnaeo-Natural combination which placed side by side families and genera that had no relation whatever to each other. With the view to improve the condition of this magnificent collection and bring it to the present level of the science, I have altered Dr. Short's arrangement agreeably to the natural classification adopted by recent authors. In this operation, which I have done with much labor, I have remarked frequent mistakes and misplaces which I have no time to correct; I leave this to be done hereafter, either by myself or by some abler botanist. E. Durand Phila. April 16th 1865."

When after 1876 John H. Redfield attacked the great task of mounting the Academy's specimens, he left untouched the Short Herbarium. The condition of these plants was much better than that of the other Academy collections, and they were contained in especially tight cardboard boxes. Under Stewardson Brown's oversight most of the Short Herbarium has been mounted and placed with the Main Herbarium, although the sheets are carefully distinguished by bearing a special stamp. In the Short Herbarium, which was hailed as ideal by contemporary judges, the specimens were unmounted, and all of the same species placed loose within the same folder; although the label of each specimen was placed with it, there was certain to ensue much confusing of labels and specimens. That evidently did not matter if one had implicit confidence that all were the same species, alike and practically interchangeable, but the course followed has made it often hopeless for us to be positive that the right label occurs with the right specimen on the sheets of our herbarium to-day. That Durand fully acquiesced in this detail of Short's practice is shown by the fact that he himself was responsible for so organizing Short's Equatorial Herbarium; he tells us how he found the tropical plants still in the bundles in which they had arrived.[8] Would he had left them so! But, instead, he zealously threw together in the same folders what was supposed to be the same species from Cuba, Colombia, Venezuela, and Ecuador, and the best that a modern curator can often do is to place with certain specimens a note stating the possibility of interchange of its label with that of some other collection. Presumably the same method was followed in organizing the Academy's "Herbarium Boreali-Americanum", although it is likely that the selection of only a single or a few specimens to stand for each species has lessened the resultant confusion.

It was in 1860 that Durand was in France, and, after visiting the Muséum d'Histoire Naturelle at Paris, decided to present his own herbarium to that institution. This course was quite consistent with his interest in the Academy's herbarium, which, by the organization of the special North American series to which he had himself liberally contributed, was now considered as supplied with whatever North American species he had to offer. The preparation of his own herbarium for Paris became the main pursuit of Durand's later years. Quotations reported by Mrs. Chase in the ensuing article show that he was working at this task and on the Short Herbarium contemporaneously. His "Preface to the General Catalogue" was dated January, 1865, although containing entries of accessions as late as the autumn of 1866. In 1868 Durand took most of his herbarium to Paris, while the remainder followed after his death in 1873.[9]

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[8] In 1864 Durand reported: "The tropical plants are yet in numerous unopened packages, consisting of Holton's *Flora Neo-Granadina,* 1852–53; Fendler's *Plantae Venezuelanae,* 1854–57; Couthouy and Jameson's *Plants* of the Andes of Quito; R. C. Alexander's *Plantae Jamaicenses;* Ch. Wright's *Plantae Cubenses,* &c. &c. When these collections are properly arranged, they will constitute an almost complete equatorial herbarium of about 6000 species."

Of course we of a later generation would give much to possess the complete herbarium of Elias Durand, rich in the many collections that he enumerates, at the Academy of Natural Sciences. Even more would we give to have another collection that Durand did not consider worth saving at all. It is an interesting fact that Mrs. Chase and I have consulted the Herbier Durand, fortunately kept apart at the Muséum d'Histoire Naturelle in compliance with the donor's bequest, for the same purpose—to seek for types of Rafinesque's species. Meehan gives two accounts of how Durand acquired Rafinesque's herbarium; in the obituary notice [10] of Durand reporting him as telling how he had come upon the specimens after they had been long stored in a loft and badly damaged by rats; but in an appreciation [11] of Rafinesque at the time of locating his grave in 1891 saying that Durand had "charitably bought his herbarium", thus implying its acquisition in Rafinesque's lifetime. The latter statement agrees with Durand's own that he "purchased the large herbarium of Rafinesque", but I do not see how this could have been until after Rafinesque's death since the latter was evidently at work on his "Autikon Botanikon" (1840) up to his death in 1840 and the distinctive "Autikon Botanikon" labels survive in the Herbier Durand. Probably it was acquired immediately after Rafinesque's death, and perhaps the word "purchased" may be understood as a belated fulfillment of a long-standing debt of plants that we know that Rafinesque was owing to Durand. At any rate Rafinesque's herbarium did pass to Durand, who frankly says that he "did not care much for his . . . plants" and evidently felt no reluctance in consigning them almost wholly to the waste-paper basket. Mrs. Chase found that not a single specimen of Rafinesque's new genera and species of grasses had been preserved; I was more fortunate in my search for Scrophulariaceae, although 8 species out of some 60 that Rafinesque described is a meagre reward. It is more pleasant to turn to Durand's careful conservation from Rafinesque's herbarium of the plants that the latter had obtained by the purchase of the herbarium of Zaccheus Collins, a Philadelphia botanist much esteemed in his time and concerning whom little has been left on record;[12] that they were counted such a valuable acquisition seems a sufficient answer to the rumor of Rafinesque's herbarium having been so damaged by rodents.

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[9] Durand's botanical library was left to the Academy of Natural Sciences, and portions of it (especially his bound series of miscellaneous papers from many botanists) are now in the library of the Botanical Department.

[10] Proc. Acad. Nat. Sci. Philadelphia 25: 357. 1873.

[11] Philadelphia Public Ledger Feb. 19, 1891, as quoted by T. J. Fitzpatrick, Rafinesque 55. 1911.

From the viewpoint of a later time Durand must be given credit for his achievement in making the botanical collections of the Academy more available for consultation; judging by the condition in which he found them, the formation of a separate North American Herbarium was an excellent idea. But its good was destined to be temporary, for within a few years after Durand's death the renovating of the Academy's herbarium had been begun by Redfield on the much better basis of actually mounting the specimens. On the other hand we must deplore Durand's limited view as to the scope of an ideal herbarium and his misjudgment as to the value of preserving all material on which species had been based, whether he considered them to be well founded or not. Had he possessed more breadth and tolerance the Academy might have been enriched by the possession both of his own accumulation of specimens and also of the herbarium that would eventually have become invaluable for its interpretation of Rafinesque's numerous and often mysterious species.

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[12] See Bartonia 9: 36. 1926; and 16: 23. 1935.

The Durand Herbarium

AGNES CHASE

In the herbarium of the Museum d'Histoire Naturelle of Paris there is a segregated collection of American plants, lost sight of by American botanists. It is the herbarium of Elias Durand, a well known botanist during the middle of the last century. He was a French pharmacist and chemist who settled in Philadelphia about 1825. In Harshberger's " Botanists of Philadelphia " (1899) there is an interesting account of Durand. There it is stated " In 1868 he carried out his long-cherished intention of depositing this herbarium in the Paris Museum, and made a long voyage to France solely for that purpose."

The plants are all unmounted, in very thick portfolios, 35 cm. × 20 cm., the specimens usually in folders, many of them containing two or more collections with labels, all loose. These folders are grouped in blue covers containing a genus or several species, depending on bulk.

The best account of the herbarium may be given in Durand's own words. In the first volume are a title page and preface which I copied verbatim, my explanations being given in brackets.

" GENERAL CATALOGUE

> of the plants native of North America/ from the 26th parallel to the arctic pole & From/ the Atlantic ocean to the Pacific; completed/ as far as the author has been permitted to do from the various botanical publications which he has been able to procure in his own and the library of the Philadelphia Academy of Natural Sciences.
>
> [Table giving English equivalents of French (metric) linear measures—omitted.]
>
> " The names marked on the margin x are represented in the herbarium by actual specimens; those with —— by figures. The number of the volume in which a plant, looked for, is to be found is at the top of the page. An alphabetic index, at the end of this volume, indicates the page where an order or a genus is to be found.
>
> " The pencil marks applied on the left of the ink marks indicate the species represented in Dr. Short's herbarium, now in the possession of the Academy—They will be rubbed off, when I have prepared the catalogue which I intend making for the Academy.
>
> " May 7 1865—My herbarium is composed of 81 volumes, for packing which 3 boxes of the following dimensions should be required, if sent
> Inside
> abroad. (Length 48 inches (clear) by 32 broad)
> depth 19 inches
>
> [Last paragraph apparently written later, handwriting cramped and not so careful as in the main part of title page.]

" PREFACE

TO THE GENERAL CATALOGUE

of the plants growing in North America, from the 26th parallel to the Polar Regions and from one Ocean to the other; with a sketch of the history of the Durand Herbarium.

" This catalogue, made up from all the botanical publications of North American plants that have appeared to this day and I have been able to procure, is intended, principally, as an index to my herbarium, with a view to a prompt and easy access to any genus or species that may be wanted for examination, and to ascertain in a moment, by means of an asterisk, the plants that are, or are not represented in the herbarium.

" Nearly half a century of assiduous labor in the study of the North American botany, at some considerable expense of time and money, and with peculiar advantages, have brought this special herbarium to a state of completeness, perhaps, only inferior to those of Prof^{rs} Torrey and Gray.—An idea of its wealth and importance can easily be found by a mere coup-d'oeil on the sheets of the catalogue, where it will be seen by the number of asterisks affixed to the specific names, that, at least, three fourths of the whole N. American plants are represented in the herbarium, either by actual specimens, or by figures (about 700 in number.) A great part of the remaining fourth may be considered, for the following reasons, as composed of doubtful species:

" It is only quite recently that some leading botanists, such as Hooker and Bentham; and with us D^{rs} Torrey and Gray, have been endeavoring to counteract certain propensities of their predecessors and also of many of their contemporaries to establish new species upon mere abnormal forms of some parts of a plant, produced by physical causes, such as difference of latitude, elevation, age, soil, exposure, &c. It has also, frequently, happened that an author, for want of sufficient books of reference, has published *as new* a species already described under 2, 3 and even more different names. These occurrences have introduced into the botanical nomenclature a superfluity of specific names, exceedingly perplexing to the student, and a great encumbrance on the science. Although much has been done already by D^{rs} Torrey & Gray to clear up these difficulties by reducing to its proper limits and original name each particular species, much remains yet to be done, and I am confident that many of the fourth part of the names not represented in the herbarium belong to that category, and will ultimately be found ill-founded species, or species already published under other names.

" My first botanical collections were made in Maryland, from 1817 to 1824. I settled permanently in Philadelphia in 1825, and continued collecting, ever since, both in Pennsylvania and New Jersey, with occasional visits to Norfolk and to the Dismall swamp. In 1826, I began exchanges with European Botanists, and in a few years I accumulated a stock of Exotic specimens amounting to over 10,000 species. But I soon found that general botany was too vast a field for one man, and I resolved to confine my studies to the plants of N. America, exclusively of all others. I, therefore, sold that exotic collection to Mr. Sullivan [Sullivant?] of Columbus, Ohio, and opened correspondence and exchanges with the most active American botanists of the time: With D^rs Short & Peter of Lexington, D^r. Currey of Tennessee, M^r Thurber, of Rhode Island, D^r Beck, of Albany, Rev. Curtis, of N. Carolina, D^r Hale, of Louisiana, M^r Turner, of Savannah, &c. &c., communicating and exchanging at the same time with my neighbours & personal friends, D^r Darlington of Westchester, M^r Wolfe of Béthlehem, M^r Conrad, D^rs Carson, Griffith, M^r James Read a Philadelphian who was in the habit of spending a good deal of his time in the Southern States.

" In 1833 or 4, I became acquainted with M^r Nuttall, from whom I purchased a set of his Arkansas plants and many of the rare species of his *genera.* I, afterwards, obtained from him similar sets of his own and of M^r Wyeth's collections in the Indian territories, in the Rocky Mountains, Oregon & California. It is also about that time that I purchased the large herbarium of Rafinesque: I did not care much for his own plants. I knew that his specimens were miserable, but he had come to the possession of M^r Collins' herbarium, had corresponded with D^rs Riddell & Carpenter of Louisiana, and from those sources I expected a good harvest of botanical matter. My hopes were not frustrated. M^r Collins' collections were to me a most valuable acquisition. He had been an excellent botanist, and on intimate terms and in correspondence with the leading botanists of the time, Elliott, Muhlenberg, Schweinitz, Bigelow, Leavenworth, Blodgett, &c. &c and especially with D^r. Baldwin and other young and enthusiastic botanists, whom he patronized. In his herbarium I found the largest collection of southern plants perhaps extant at the time. My herbarium began from this time to be interesting and went on increasing every year.

" New additions succeeded each other: I received from my friend Nicollet a suite of the collections made in his exploration of the sources of the Mississippi River. I bought a set of plants collected in Oregon by the Rev. Spalding, another set of the collections of M^r Oakes in the New England States and on the White Mountains of New Hampshire and was presented by the Rev. Steinhaur with a collection of Labrador plants. I also became a subscriber to the Texas collections of Lindheimer, from 1843-48; to those of Fendler, in New-Mexico and to those of Ch. Wright in Western Texas, New Mexico, Coahuila & Sonora.

" From 1854 to 1860, several large collections were placed in my hands, for description, by the Philadelphia Academy of Nat. Sciences: 1*st*, (Principally Californian) collected by Dr Heermann, in the survey for a R. R. R. from the Mississippi to the Pacific, under Lieut. Williamson; 2*nd* Another collection made by Dr Woodhouse, in a similar survey, along the Gila River and Lower Colorado and through New-Mexico; 3*d*, a set of plants collected in the vicinity of Nevada City by Mr Henry Pratten; 4th another collection made by Mrs Carrington, a Mormon lady, in the Valley of the great Salt Lake or Utah; and, lastly, The arctic plants collected in their expeditions to Smith's sound, by Drs Kane and Hays. Naturally, for my trouble, I reserved duplicates for my herbarium. I must add that Drs Torrey, Gray and Engelmann have always been exceedingly liberal towards me and I am indebted to them for many rare specimens, among which [are] the plants collected by Col. Fremont in his journey to California, and some sub-arctic plants from the Northern British possessions.

" In the herbaria of Messrs Leconte, Read and Dr Watson, presented, after their death, to the Academy of Natural Sciences, I found copious duplicates which I was permitted to secure, in exchange for over fifteen hundred specimens, abstracted from my own herbarium to be placed in the N. American herbarium which I have prepared for the Academy.

" Latterly I have added to my collection the plants of Wisconsin and Iowa received from Messrs Lapham and T. I. Hale, two Texan collections from Dr Lincecum and Dr Buckley; the Alpine Colorado plants of Dr. C. C. Parry and Messrs. Hall, Harbour and Howard; a set of Illinois plants from Mr Elihu Hall; another from Alabama & Florida from Mr. Buckley and my own gathering in the Alleghany mountains and in Western New-York, with my late exchanges with Prof. Porter, Messrs Canby, Bebb, Viot, [? illegible] the Rev. Mr Blake of New-Hampshire and Abbé Brunet of the Laval-University of Quebec.

" The Durand-Herbarium is now composed of 82 volumes, averaging from 100-150 species & varieties or abnormal forms. It forms a total of about 8000 distinct species, exclusive of the lower orders of Cryptogams of which I have a good number; but the study of which I have been obliged to abandon for want of good eyes. It contains plants of every portion of North America from one ocean to the other; many from Northern Mexico and from the British provinces. What renders it particularly valuable is that the greatest part of the specimens are authenticated by the label in the hand-writing of the authors.

" In the autumn of 1866, I received from Dr Chapman, the author of the Flora of the Southern States a set of Florida plants, as types of his flora. And also a collection of more than 400 N. A., mosses, from my friend, Mr James.

" Philadelphia, January 1865

E. DURAND "

Written on the margin of the first page of the Preface is the following:

> "These plants of Nuttall, of which I then had the same species from other sources, I gave to D^r Gray in 1866, on the condition of furnishing me with the identical species of those marked *unique,* as far as it would be in his power. I thought these original species and genera were owing to the herbarium of D^r Gray, which was to be the standard herbarium of the North Amer. plants."

The whole catalogue, in a leather bound ledger, fills 322 pages (35 cm) to which are added four pages giving "noms de Botanists & collecteurs Américains qui ont été donnés à des genres ou espèces de plantes N. Americains." There are 126 names. After each is given any genera or species named for the person.

Vol. I begins with Ranunculaceae.

I examined the grasses in the hope of finding some of the unknown Rafinesque genera, but I did not find a single slip with Rafinesque's name, nor is his name among those of collectors on the outsides of the folders. It would seem that Rafinesque's own collections were discarded as worthless.

The Gramineae are contained in volumes LXXI to LXXVI. They begin with *Leersia* and end with *Sorghum* and *Zea; Monanthochloë,* then recently described, is added at the end. There are several other recently described grasses, such as *Pleuraphis Jamesii* and *P. mutica; Graphephorum flexuosum,* type collection, (*Redfieldia flexuosa* (Thurb.) Vasey); *Lophochlaena* (*Pleuropogon*); and *Munroa.* Most of the specimens are fragmentary but not more so, perhaps, than are the general run of botanical specimens of that time, collected as they were under great difficulties. There are a large number of grasses from Wright, Fendler, and Buckley. Dr. Linsicum supplies copious economic notes. He says that *Buchloë dactyloides* was called "hog-wallow grass," because in early days the only place it found to take possession of was hog-wallows. Now that roads and farm yards were cutting up the ground this grass was extending into such places.

There are a large number of classic collections, some of Nuttall, Gamble, Douglas, Bolander, Hayden, and Hall and Harbour, from the West; Kellogg from Alaska; Dr. Kane from Greenland; besides collections by Nicollet, Short and Peter of Kentucky, M. A. Curtis, Canby, Porter and others.

Filices occupy volume LXXVII, and Musci and Hepaticae volume LXXVIII. In volume LXXIX "Lichens, Fungi, Alga, Naidacea" is the following note:

> "Oct. 1st 1864.—The six above orders of the lower cryptogams are not included in the present catalogue: They may contain 2000 species of which about one fourth are represented in my herbarium. They do not belong to my specialty.
>
> "The total number of orders or natural families entered in the present general catalogue of the known North American plants is 175, all repre-

sented in my herbarium. Total number of genera 1718 of which 1655 are represented; wanting 63.

" Total number of species 9561 of which 7800 are represented; wanting 1761, of which more than one half are either doubtful species published under other names or anomalous forms of known species, &c.

" Besides the specimens present in my herbarium, there are over 700 figures mostly of plants that are not represented by specimens and I have no doubt that several hundred species extant in my herbarium have been omitted being marked.

" The total number of species of North American plants, including the lower cryptogams, do not perhaps go beyond 10500 of which 7500 are represented in my herbarium by specimens or good figures."

[7800 named at the beginning was written over some other figure erased. Probably a recount or re-estimate raised the number from 7500 to 7800.]

Bureau of Plant Industry, Washington, D. C.

Reviews

Flora of the Niagara Frontier Region[1]

This work, which constitutes one of the volumes in the Bulletin of the Buffalo Society of Natural Sciences, deals with the ferns and seed plants which occur within a radius of about 50 miles of Buffalo, N. Y. It is the first treatment of the flora of this area to appear since the publication of D. F. Day's " Plants of Buffalo and Vicinity " in 1882.

As might be expected, the main body of the present Flora is devoted to a systematic account of the species and varieties, of which there are 1702, to be found within the area.

Nomenclature is based upon the International Rules and is modern to a degree that is highly gratifying. The author has made free use of most of the important revisionary treatments which have appeared in the literature in recent years, with the result that such genera as *Potamogeton, Elymus, Panicum, Carex, Amelanchier, Potentilla* and *Eupatorium* might be recognized with difficulty by the reader who is familiar only with the current editions of our manuals. In most cases, though unfortunately not in all, the author supplies the necessary citational references for the newer segregates.

The taxonomic tenor of the work is, on the whole, conservative. True, one may regret that Sargent's disposition of certain species of *Salix* and *Quercus* has been followed, but, on the other hand, it is a matter for rejoicing that *Crataegus* has received a sane and logical treatment, representing a reaction against the tendency toward limitless dissection. It is further gratifying to see Fernald's reduction of the *Panicum Lindheimeri* complex incorporated.

For all species which are not ubiquitous a list is given of the localities at which the plant is known to occur. The stations are written out in full, rather than abbreviated or indicated by symbols, a practice which, though increasing the size of the work, definitely augments its attractiveness. Great care has apparently been taken to check earlier references contained in Day's Catalogue and other sources, with the result that all doubtful records have been excluded. This, it must be insisted, is a task which is incumbent upon all makers of local floras.

An interesting feature of the systematic section is the attempt, under each species, to differentiate between frequency of distribution and relative abundance. To this end two sets of terms have been selected and are consistently employed. First, we are told, whether a given species is " rare ", " frequent " or " common ", adjectives designed to express occurrence or distribution in space. Then, by the use of such terms as " solitary ", " sparse ", " abundant " or " dominant ", we are informed as to the plant's relative abundance or density in a given locality.

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[1] Zenkert, C. A. The Flora of the Niagara Frontier Region. Vol. xvi. Buffalo Soc. Nat. Sci. Buffalo, N. Y. 1934.

Thus, *Kalmia polifolia* is "rare" [within the area] but "abundant" [where it does occur], while *Monotropa uniflora* is "frequent to rather common" [i. e., widely dispersed in space] but "sparse" [at individual localities]. It may, of course, be argued that the terms utilized are arbitrary and subject to personal interpretation, but it must be admitted that the systematized separation of space- and place-data is a forward step and gives a much truer picture of occurrence than when a single designation is employed. The procedure is one which, while scarcely applicable in manuals covering a wide region, can not but commend itself to the student of local areas.

In addition to the systematic portion of this Flora there is much to interest the student of ecology and plant geography. After reviewing the early botanical history of the region—a history embellished by such names as Kalm, Michaux and Pursh—the author delves into a discussion of the topographical and geological features of the area. As all but a very small section of the region lies north of the boundary of the Pleistocene ice, the relation of plant distribution to the effects of glaciation is indeed a fundamental one. Although the author touches on this subject, he fails to develop it as exhaustively as the nature of the problem would seem to warrant.

The Niagara Frontier Region lies largely within the Alleghenian life-zone, but within its flora are represented two minor geographic elements of widely differing character: one boreal, the other austral or coastal plain. Lists are given of representative species of each element and an attempt is made to account for their presence in the area under consideration.

Climatic factors are interestingly dealt with, data being presented on temperature, rainfall and length of growing season, with reference to their effects upon plant distribution. Considerable attention is devoted to one of the most important factors determining modern distribution, namely, the changes wrought by the hand of man.

The work closes with a discussion of ecological areas and plant societies accompanied by carefully compiled lists of representative plants which characterize certain distinctive formations or habitats.

A word is in order concerning the many fine photographs with which this Flora is illustrated and which show individual plants as well as interesting habitats and general topographic features.

Few local floras known to the reviewer present such a wealth of detail bearing upon the problems of plant distribution. In this and in other respects the present work sets a high standard as a treatment of a restricted region. It is on such essential blocks alone that more comprehensive floristic structures can be reared.

J. M. F.

Manual of the Southeastern Flora [1]

It was in 1903 that Dr. John K. Small published his " Flora of the Southeastern United States ", and now thirty years later has appeared his " Manual of the Southeastern Flora ". Both works are on the same pattern, and, although the paper has become thinner and the cover changed from blue to green, both are about the same size, the present volume containing 1554 pages. But in many ways the later work is an advance, both in knowledge and in presentation.

During the intervening period scarcely a year has failed to find the author in the field. His studies have been chiefly in Florida, and especially in its southern subtropical portion. Meanwhile drawings of unusual merit have been made for each genus, mostly by Miss Mary E. Eaton, but for grasses by Mrs. Agnes Chase, and for *Carex* by Mr. H. Creutzberg. Various authors, as enumerated in the preface, have been preparing text of certain families.

As the study approached completion it seemed desirable to divide the large area of the " Flora " into two works, the present " Manual " for that east of the Mississippi River and another for the South Central States, Arkansas, Oklahoma, Louisiana, and Texas. Hence, the present book is the first half of Dr. Small's new revision, and we may await a similar book on the remaining states.

With revised keys and descriptions, and especially with many detailed illustrations, the " Manual " is a much more usable book than the old " Flora ". Ranges also have been well revised, and these are formulated according to the natural physiographical areas approved by geographers; this feature has been developed by Dr. Edgar T. Wherry, who gave much further aid, even to reading all the proofs. A feature, contrary to our habitual thought, but in accord with the latest migrations of the species, is the stating of ranges from south to north.

The taxonomic standards of the " Flora " of 1903 continue unchanged in the " Manual " of 1933. There is the same reluctance to admit categories below the rank of species, although this is occasionally done within the specific descriptions (but in a form that fails to show their geographic significance). There is the same freedom in forming genera for groups that stand out with some prominence in the area of this study. While sympathizing with the view that a floristic worker may know a geographically restricted group with a thoroughness often unachieved by a monographer, one questions whether he can adequately weigh its characters without making comparisons over more extended territory. The dividing of our species of maple into five genera would be more convincing if proposed in a study that gave discussions and considered these trees over the North Temperate Zone in both hemispheres. However, there is a practical side of the matter that makes some amends to the user of this particular " Manual ". On Dr. Small's plan of providing a drawing for each genus, the user gets the benefit of many more illustrations than a more conservative author would have allowed him!

F. W. P.

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[1] Manual of the Southeastern Flora. By John Kunkel Small. Published by the author. New York City. 1933.

The Muhlenberg Botanical Club of Lancaster, Pennsylvania

The Muhlenberg Botanical Club of Lancaster was organized Nov. 2, 1932 by eleven people who, drawn by their mutual love of nature, had drifted together on the public hikes sponsored by the Lancaster Recreation and Playground Association under the direction of Grant D. Brandon and led by Dr. H. Justin Roddy, curator of the museum of Franklin and Marshall College. The eleven organizers were William H. Auxer, Miss Emma Groff, Mrs. Charles Y. Tanger, Miss Ruth Sener, Miss Mary Rose, Miss Mary Powers, Miss E. Ruth Beattie, William S. Gleim, Miss Ethel Auxer, Donald Brackbill, and Leonard Harner. All were, and are, the merest amateurs but they had a genuine love of plants and an earnest desire to learn more about them.

These basic feelings were responsible for the aim of the club. The group felt that it was pleasanter and more effectual to work together than to wrestle alone with the many difficulties that present themselves to beginners in the study of botany. But in addition to this they wanted to help to create a sentiment, strong enough to do some good, in favor of conservation, the underlying principle being that one's real love of wild flowers may be accurately gauged by one's consideration for them. Logically, they thought, conservation might best be served by stimulating an interest in the study of plants and their needs.

The choice of a name was almost spontaneous. Henry E. Muhlenberg, one of the greatest American botanists of his day, came to Lancaster in 1780, as pastor of Trinity Lutheran Church, and lived there, at 33 North Duke St., until his death in 1815. It may seem presumptuous for a group of amateurs to use his name thus, but a great name is an inspiration, and it was taken reverently, as one adopts a motto.

The club has no constitution and had, at first, no dues. It was decided to hold indoor meetings on the first Wednesday of the month, from October to April, in the homes of the members; at each meeting a suitable paper was to be read. Field trips are taken every Saturday afternoon, throughout the year. No schedule was arranged in advance for these trips, the members preferring to be quite free to decide on short notice where they wanted to go. Thus, on cold, blustery days satisfactory trips could be made to sheltered ravines to look for new stations for some of the rarer Aspleniums, etc., while on mild days high, exposed rock ridges and open country could be explored quite comfortably. This arrangement left them free at all times, winter or summer, to follow up any interesting new clues that developed.

The membership increased so rapidly during the fall of 1933 that the club outgrew the homes of its members and Dr. H. Justin Roddy offered us a room in the Science Building on the College Campus as a regular meeting place. He also provided a lantern and screen for illustrated lectures.

Several joint hikes were held during the spring and summer of 1934 with the Harrisburg Natural History Society. These were so much enjoyed that it is hoped to have more of them. On these trips it has been most interesting to note the differences in the flora of Dauphin and Lancaster Counties. The club would like to have more trips of this sort with similar groups in other neighboring counties.

Among our conservation activities has been the moving of rare plants from natural stations that are being destroyed to new and safer ones. There is much more of this work to be done.

During the spring and early summer of 1934 a " Save the Wild Flowers " campaign was conducted. Dr. Roddy opened it with a radio broadcast from the auditorium of the West Junior High School, arranged by Miss Mary Rose of that school. Through her enthusiastic efforts the teachers in many of the schools cooperated whole-heartedly, arranging illustrated wild flower talks, holding poster contests, etc. There were editorials in the papers as well as short articles by members of the club from time to time, suggesting ways of enjoying the wild flowers without destroying them, such as photographing them, etc. " Save the Wild Flowers " posters were shown in the store windows about town and on the markets, where many wild plants are sold, rather than at the stations for rare plants, for our experience has been that at such places these notices do more harm than good by calling attention to the plants, which frequently suffer in consequence.

Efforts to protect the only colony in the county of *Trillium grandiflorum,* in a ravine in southern Lancaster Co., have so far not met with success. The owners of the land expressed a willingness to post trespass notices but felt they could go no further. However, even that was apparently forgotten. The owners are willing to lease the land at a very moderate price, to effect the protection of the flowers, but the club has felt, so far, that it could not both do this and employ several men during the brief blooming season of the trilliums to effectively prevent people from taking them away by the thousand. This remains one of our unsolved problems.

The club is cooperating with a County Committee in trying to arouse an interest in the reforestation of privately owned lands in the county.

Now, (January 1935), there are 70 members. Our dues are now $1.00 per year. The officers who have served since the organization of the club are: William H. Auxer, President; Miss Emma Groff, Treasurer; Louise F. A. Tanger, Secretary.

L. F. A. T.

General Notes

Discovery of Elliottia seed. As noted in two previous articles in this journal by Harry W. Trudell,[1] the seed of *Elliottia racemosa* has thus far been unknown to science. Attempts to cross-pollinate different colonies in the field and in cultivation have always failed for one reason or another, and the seeds remained elusive. In 1932 as recorded by the writer[2] a colony of this shrub was called to our attention by Dr. Wallace A. Kennedy of Metter, Georgia, so situated that fires were kept out and the plants could develop normally. Late in 1934 Dr. Kennedy visited the colony again, and found that some of the shoots had perfected capsules, so he sent these on for investigation. Some of them proved to contain a few seeds, apparently with imperfect embryos and incapable of germination, but nevertheless representing the first known seeds of this rare species. The seed is a smooth, gray, strongly flattened spheroid about 1½ mm. in broad diameter, surrounded by an equatorial wing somewhat over 1 mm. wide, making the whole about 3½ mm. across.

Edgar T. Wherry

Claytonia. During 1934 a new local botanical journal made its appearance, in mimeographed form. It is published by the Committee on State Flora of the Virginia Academy of Science, and being devoted primarily to articles on the plants of that state, is appropriately named after John Clayton. The earlier numbers came out at irregular intervals, but beginning with volume 2 monthly issue is planned. Its pages have contained to date a variety of material, including notes on the history of botany in Virginia, accounts of the work of early botanists, reports of finds of rare species, summaries as to the distribution of individual species or groups within the state and similar material. Vascular plants are chiefly covered, but there have been a few notes on mosses.

In early issues reports of plants were accepted from amateurs without verification and some of the notes published are wholly incredible—such as the alleged occurrence of *Listera cordata* at sea level in the southeastern part of the state, but a requirement that such reports be substantiated by specimens was later put into effect. The Editor is Professor Ruskin S. Freer of Lynchburg College, and the Business Manager Major Robert P. Carroll of V. M. I., 213 Maiden Lane, Lexington, Virginia; subscription rate, $1.00 per year.

E. T. W.

A case of incomplete mapping of plant ranges in the Philadelphia region. In a recent paper on the Prairie Peninsula, Professor Transeau[3] has published a series of maps showing by county dots the supposed ranges of several native trees. In Ohio and vicinity these are satisfactory, but unfortunately he has extended them to the Philadelphia region without obtaining adequate data. As a result he shows *Tsuga canadensis* as growing in our region only in Berks and New Castle counties, *Liriodendron tulipifera* as being absent from Philadelphia, Delaware, New Castle and Cecil counties, and so on. Since this paper deals primarily with a more western problem, one might say that this made no difference. But sooner or later some European plant geographer is going to copy one or more of these maps and speculate on the " phytogeographic laws " leading to peculiar distributions of these trees toward the southeastern margin of their range. One might wish that there were a phytogeographic law that would forbid anyone publishing a map without making a reasonable effort to see that all readily accessible information was placed upon it.

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[1] Bartonia 9: 11. 1926; 10: 24. 1929.

[2] Scientific Monthly 38: 82. 1934.

[3] Ecology 16: 423. 1935.

E. T. W.

Errata for Bartonia, no. 16. The following errors in our last issue have been noted:

Page 46, line 12 from bottom. Read " Indiana " for " Illinois ".

Page 61, under " Botanical Gazette ". Read " Notes on Isoetes riparia and Isoetes saccharata."

Program of Meeting during 1934

Date	*Subject*	*Speaker*	*Attendance*
Jan. 25	Rhododendrons from Here and There	G. G. Nearing	35
Feb. 15	A Visit to some Alpine Gardens of Europe	Prof. M. A. Chrysler	29
Mar. 22	The local Species of Polygonum	Hugh E. Stone	29
	Reviews of recent Floras by Rydberg and Small	Drs. John M. Fogg, Jr. and Edgar T. Wherry	
Apr. 26	Studies of our Fleshy Fungi, especially the soil Hymenomycetes	Dr. Kenneth D. Doak	23
May 24	Collecting Plants in Tropical America	Mrs. Ynes Mexia	15
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Oct. 25	Botanical Research under way in Scotland, as seen on a recent Trip	Prof. William Seifriz	30
	Local Species of Helianthus	Prof. John M. Fogg, Jr.	
Nov. 22	Features of the Flora of Columbia County, New York	Rogers McVaugh	40
Dec. 20	Geographic Relations of the Eastern Phloxes	Dr. Edgar T. Wherry	27

List of Officers and Members

John M. Fogg, Jr., *President*
Harry W. Trudell, *Vice-President*
Robert R. Tatnall, *Secretary*
Arthur N. Leeds, *Treasurer*
Bayard Long, *Curator*

ACTIVE MEMBERS

	Elected
J. W. Adams, 32 Pleasant St., Germantown, Philadelphia, Pa.	1925
A. G. Alderfer, Sellersville, Pa.	1932
Lewis E. Anderson, University of Pennsylvania, Philadelphia, Pa.	1934
Edwin B. Bartram, Bushkill, Pa.	1906
J. Russell Bebler, 135 E. Phil Ellena St., Germantown, Philadelphia, Pa.	1919
Prof. Don M. Benedict, Temple University, Philadelphia, Pa.	1932
Dr. Walter M. Benner, 5636 Loretta Ave., Frankford, Philadelphia, Pa.	1912
Jasper T. Bentley, 7334 Rural Lane, Mt. Airy, Philadelphia, Pa.	1933
Carl E. Bliss, 55 Randolph Place, South Orange, N. J.	1924
Mrs. D. N. Borodin, 2 Center Ave., Willow Grove, Pa.	1933
Carl Boyer, Wagner Institute, 17th St. & Montgomery Ave., Philadelphia, Pa.	1926
J. Claudius Boyle, 225 Kenmore Road, Brookline, Upper Darby, Pa.	1919
Milton Campbell, 4401 Pine St., Philadelphia, Pa.	1928
Prof. M. A. Chrysler, Rutgers University, New Brunswick, N. J.	1931
F. Van Buren Connell, 443 Berkley Road, Haverford, Pa.	1924
Mrs. T. B. Dallas, 306 W. Springfield Ave., Chestnut Hill, Philadelphia, Pa.	1933
Dr. Kenneth D. Doak, Allegheny Forest Exper. Sta., 3437 Woodland Ave., Phila., Pa.	1934
Robert R. Dreisbach, 410 Jerome St., Midland, Mich.	1922
Leonard J. Duersmith, 511 Walnut St., Columbia, Pa.	1931
Miss Elizabeth C. Earle, 4209 Chester Ave., Philadelphia, Pa.	1935
Howard W. Elkinton, 6514 Germantown Ave., Philadelphia, Pa.	1931
Mrs. Edward W. Evans, 6014 Chew St., Germantown, Philadelphia, Pa.	1932
Mrs. Harold Evans, Awbury, E. Washington Lane, Germantown, Philadelphia, Pa.	1931
Richard Blossom Farley, 1828 Rittenhouse St., Philadelphia, Pa.	1931
Dr. John M. Fogg, Jr., University of Pennsylvania, Philadelphia, Pa.	1921
Fairman R. Furness, Media, Pa.	1935
Mrs. Howard L. Godfrey, 6312 Morton St., Germantown, Philadelphia, Pa.	1935
Arthur M. Henry, 416 New Post Office, Atlanta, Ga.	1927
Howard K. Henry, 1464 Grayton St., Penn Wynne, Pa.	1932
Mrs. J. Norman Henry, Gladwyne, Pa.	1932
Frederick J. Hermann, University of Michigan, Ann Arbor, Mich.	1932
F. F. Huber, Pennsburg, Pa.	1911
Charles F. Jenkins, Kitchens Lane, Mt. Airy, Philadelphia, Pa.	1934
Miss Clara Kast, 2004 Spring Garden St., Philadelphia, Pa.	1932
Addison D. Kern, 222 W. Linton St., Philadelphia, Pa.	1929
Miss Natalie B. Kimber, 538 E. Locust Ave., Germantown, Philadelphia, Pa.	1928

Rev. William U. Kistler, 118 Main St., Pennsburg, Pa.	1911
Prof. W. A. Kline, Ursinus College, Collegeville, Pa.	1911
Charles E. Knopf, 7200 N. Cresheim Road, Chestnut Hill, Philadelphia, Pa.	1931
Albert Middleton Laessle, 511 Runnymede Ave., Jenkintown, Pa.	1932
Dr. Henry A. Laessle, 5900 Market St., Philadelphia, Pa.	1894
Dr. Charles H. La Wall, 214 S. 12th St., Philadelphia, Pa.	1896
Arthur N. Leeds, 1025 Westview St., Germantown, Philadelphia, Pa.	Founder
Morris E. Leeds, 1025 Westview St., Germantown, Philadelphia, Pa.	Founder
Alfred G. Lisi, University of Pennsylvania, Philadelphia, Pa.	1934
Dr. Harry A. Lloyd, 200 N. 35th St., Philadelphia, Pa.	1931
Bayard Long, 250 Ashbourne Road, Elkins Park, Pa.	1906
Miss Margaret Loos, Collingswood, N. J.	1935
William E. McGowan, 3805 Locust St., Philadelphia, Pa.	1932
Rogers McVaugh, University of Georgia, Athens, Ga.	1930
Adolf Müller, Box 66, Norristown, Pa.	1920
Mrs. George B. Orr, Orchard Way, Berwyn, Pa.	1935
Miss Elizabeth G. Ostheimer, Jenkintown, Pa.	1933
Dr. Samuel C. Palmer, 612 Ogden Ave., Swarthmore, Pa.	1929
Dr. G. Harmer Patton, 61 E. Penn St., Germantown, Pa.	1929
Mrs. Theodore Paul, Devon, Pa.	1935
Dr. Francis W. Pennell, Moylan, Pa.	1910
Edward Pennock, 3609 Woodland Ave., Philadelphia, Pa.	Founder
Harold W. Pretz, 123 S. 17th St., Allentown, Pa.	1909
George Redles, 207 E. Wister St., Germantown, Philadelphia, Pa.	1917
Dr. W. H. Reed, Jeffersonville, Pa.	1892
Charles C. Roberts, 75 W. LaCrosse Ave., Lansdowne, Pa.	1926
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Dr. Walter Steckbeck, University of Pennsylvania, Philadelphia, Pa.	1925
Hugh E. Stone, Haverford, Pa.	1892
Dr. Witmer Stone, Academy of Natural Sciences, Philadelphia, Pa.	Founder
J. Fletcher Street, 1120 Locust St., Philadelphia, Pa.	1918
Mrs. Kenneth E. Stuart, 367 Baird Road, Merion, Pa.	1933
Dr. H. K. Svenson, Brooklyn Botanic Garden, Brooklyn, N. Y.	1934
Dr. Robert R. Tatnall, 1100 W. Tenth St., Wilmington, Del.	1928
Miss Grace M. Tees, 458 Locust Ave., Germantown, Philadelphia, Pa.	1934
Arthur H. Thomas, Haverford, Pa.	1928
Horace E. Thompson, 5016 Schuyler St., Germantown, Philadelphia, Pa.	1920
Harry W. Trudell, 2030 E. Madison St., Philadelphia, Pa.	1915
Prof. Rodney H. True, University of Pennsylvania, Philadelphia, Pa.	1925
Paul R. Wagner, Ursinus College, Collegeville, Pa.	1935
Robert F. Welsh, 132 S. 4th St., Philadelphia, Pa.	1909
Dr. Edgar T. Wherry, University of Pennsylvania, Philadelphia, Pa.	1925
Dr. Edward E. Wildman, 4331 Osage Ave., Philadelphia, Pa.	1931
Hans Wilkens, 241 S. 11th St., Reading, Pa.	1928
William H. Witte, 16 York St., Camden, N. J.	1898
Miss Mary F. Wright, Boxwood Farm, Ambler, Pa.	1928

HONORARY MEMBERS

Samuel N. Baxter, Fernhill Park, Germantown, Philadelphia, Pa.	1918
Joseph Crawford, 16 E. Stewart Ave., Lansdowne, Pa.	Founder
Dr. Joseph S. Illick, State College of Forestry, Syracuse, New York	1925

CORRESPONDING MEMBERS

Charles C. Bachman, Slatington, Pa.	1908
Otway H. Brown, 1048 Washington St., Cape May, N. J.	1908
Stewart H. Burnham, Cornell University, Ithaca, N. Y.	1911
Prof. M. L. Fernald, Gray Herbarium, Harvard University, Cambridge, Mass.	1929
Dr. A. Arthur Heller, Chico, Calif.	1893
Dr. Harold St. John, University of Hawaii, Honolulu, T. H.	1927
Charles F. Saunders, Pasadena, Calif.	1893
Dr. John K. Small, New York Botanical Garden, New York, N. Y.	1893
Dr. William Randolph Taylor, University of Michigan, Ann Arbor, Mich.	1921
Dr. Campbell E. Waters, Washington, D. C.	1904
Dr. Heber W. Youngken, Massachusetts College of Pharmacy, Boston, Mass.	1918

RECENTLY DECEASED MEMBERS

	Died
Dr. Herman A. Burgin, Active	April 14, 1935
Mayne Reid Longstreth, Active	Feb. 23, 1935
Samuel S. Van Pelt, Honorary	June 28, 1935

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No. 18 1936

BARTONIA

PROCEEDINGS OF THE
PHILADELPHIA BOTANICAL CLUB

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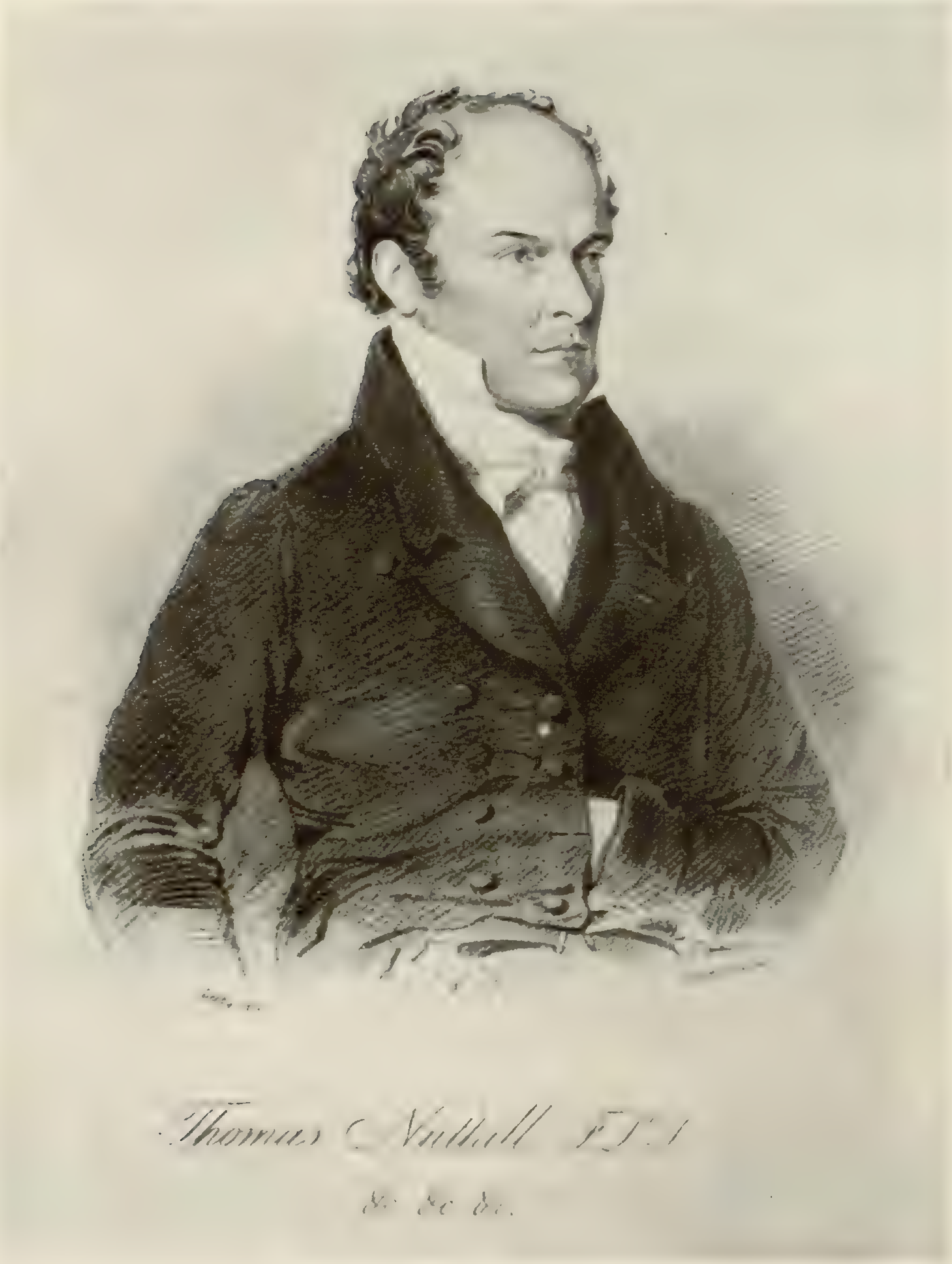
Thomas Nuttall F.L.S.
&c &c &c.

THOMAS NUTTALL IN 1824

BARTONIA

PROCEEDINGS OF THE PHILADELPHIA BOTANICAL CLUB

No. 18 PHILADELPHIA, PA. 1936

Travels and Scientific Collections of Thomas Nuttall[1]

FRANCIS W. PENNELL

Among the Philadelphia botanists of a century ago none held so high a scientific position as Thomas Nuttall. He had then spent half his life in this country, and was just returned from the longest of his many journeys. He had gathered specimens over much of temperate North America, beyond the limits of what was then the United States and even in Hawaii, and in the quiet of the Academy of Natural Sciences he was zealously studying his very extensive collections. He was engaged in preparing a series of detailed taxonomic papers, revisions more intensive than the outline of North American plants that he had published, largely by his own skill as a printer, eighteen years earlier. Nuttall was then fifty, and still destined to have 23 more years of active life. Before we tell the remarkable reason why the botanical promise of his later life was not realized, let us follow the course of his earlier years so as to see how his herbarium had been formed.[2]

[1] It was our hope that the account of Nuttall for this number of BARTONIA would have been contributed by Mr. Willard W. Eggleston of Washington, D. C., who had followed the pioneer's career with long attention and who knew so intimately each section of the country that Nuttall visited. This hope was sadly frustrated by Mr. Eggleston's sudden death on November 25, 1935. Through the kindness of his widow, a summary of Nuttall's life signed by Mr. Eggleston and dated January 18, 1921 has been sent me, and its suggestions have contributed to the present account.

[2] Besides incidental references and the internal evidence of his publications, our knowledge of Nuttall's life is nearly wholly derived from two obituary accounts, independently prepared in this city and both given to the world early in January, 1860, within four months of his death in England. At the first of January there appeared in The Gardener's Monthly (2: 21-23) an unsigned " Biographical Sketch of the late Thomas Nuttall." As the editor, Thomas Meehan, who was born in 1826, only arrived in this country and at Philadelphia in 1848, it is evident that the intimate picture of Nuttall therein given must have been supplied by others. On the sixth of the same month Elias Durand read before the American Philosophical Society a " Biographical Notice of the late Thomas Nuttall," which was issued in its Proceedings (7: 297-315. 1860). Durand, who settled in Philadelphia in 1825 and at once joined the Academy of Natural Sciences, knew Nuttall personally, and this more elaborate paper has been the basis of most subsequent accounts of him. Both narratives build largely upon reminiscences collected from a group of Philadelphians, but, because these were set down

It was a century and a half ago, on January 5, 1786, that Thomas Nuttall was born in western Yorkshire, England. His father, Jonas Nuttall, was a printer at Blackburn in Lancashire, and there and to that trade young Thomas grew up. He worked in Liverpool and in London. Then, in the spring of 1807 or 1808,[3] when he was twenty-one or twenty-two, he sailed for America to try his fortune in a New World. His ship, the "Halcyon," minus its masts from the storms of April, came up the Delaware Bay to Philadelphia, and never had a young adventurer looked with more delight upon the verdure of our coasts. For Thomas Nuttall was already a botanist.[4]

We learn little of Nuttall's business doings after his arrival in our city, although there are glimpses of him such as that reported by Professor Torrey. When the latter was preparing for publication his "Flora" in 1824, the printer engaged upon it asked who might be the "Nuttall" so frequently mentioned therein, saying that he had once worked with a young printer of that name who used to spend most of his time in reading books. His fellow worker had been the coming botanist. We do not know how successful Nuttall was as a man of business, or how he gained freedom from it for such extensive periods. We know

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more than eighteen years after Nuttall's return to England, the details, and even the course of events, may fail in exactness. Of the two the first is the more trustworthy, and I think that it must have been actually written, though with editorial additions, by someone who knew Nuttall well; and the special knowledge of his last years in England leads me to think that the writer was Dr. Charles Pickering, who not only was intimately associated with Nuttall for years at the Academy of Natural Sciences but who, Durand tells us, visited him in 1854 in England. Records of attendance at the Academy's meetings show that Pickering was in Philadelphia during the months when these accounts were being prepared. As this is only a conjecture, however, we shall term the author simply "Meehan's informant."

[3] The later year is given by Nuttall himself in the introduction to his "North American Sylva", but C. W. Sutton's brief sketch in the "Dictionary of National Biography," London, 1895, says that "in March 1807 he went to the United States." I do not know upon what evidence this rests, but, as we shall find other instances of Nuttall's forgetting the years of events, there is a likelihood of his having come in the earlier year.

[4] Both Durand and Meehan's informant relate an anecdote, which the latter states had been told by Nuttall himself to Dr. Pickering. It seems that on "the morning after his arrival in Philadelphia," the young man found along the Schylkill our greenbrier, but thought that it must be a passion flower. As Meehan's informant continues the tale, "he inquired for a 'Botany Book' and was told that a Dr. Barton had written one," and it was only after a vain search in the stores for a copy that he sought an introduction to Dr. Barton. But Durand has him go at once to the professor, to whom he is fortunately directed, and who, with Nuttall's specimen in hand, explains to him the differences between *Smilax* and *Passiflora*. To Durand the incident meant that on his arrival in America, Nuttall "was totally ignorant of [the] first principles of botany." But was not the error a natural one for a beginning botanist confronted for the first time by the net-veined leaves of *Smilax*, and who may well have anticipated finding the American genus *Passiflora?* The inference reveals some knowledge of what plants to expect, and confirms the statement of Dr. Barton himself (see Appendix D) that he had observed in the young Nuttall "an ardent attachment to, and some knowledge of, Botany," while John Windsor, whom Nuttall, in dedicating the genus *Windsoria*, called "my earliest Botanical friend," states in his "Flora Cravoniensis" (1, footnote, 1873), that Nuttall had gotten his first botanical knowledge in England. Such knowledge explains how he so quickly came to know his American plants with keen discrimination. The reference to Windsor's note is due to the kindness of my friend, Dr. John Hendley Barnhart of the New York Botanical Garden, who, with characteristic generosity, has placed his bibliographic knowledge at my disposal.

rather what a rich fortune he found in following the interests that he loved most. He collected and described plants, traveling far in search of them and publishing a succession of botanical papers. He remained unmarried and how far his journeys were of his own financing it is difficult to say.

Apparently the incident of the greenbrier brought Nuttall at once to the notice of Benjamin Smith Barton, professor of botany in the University of Pennsylvania and author of the first American textbook of botany. The young man zealously attended Barton's lectures, and Meehan's informant tells us that after one of these Barton referred him for further information to William Bartram, and that to the latter "the world is indebted for the sealing of [Nuttall's] scientific proclivities." Barton himself took a keen interest in Nuttall. In 1808 the professor had just lost his indispensible helper, Frederick Pursh,[5] whom he had been employing to further the project of a new North American Flora. In 1806 and 1807 Pursh had made extended field-journeys at Barton's expense. The professor quickly appreciated Nuttall's interest and ability, encouraged him through access to his own house and books, and was soon employing him to continue the gathering of material toward this Flora. Papers and memoranda, very recently brought to light as explained by Mrs. John R. Delafield in our Appendix E, show that from 1809 to 1811 Nuttall's field-journeys were financed by Barton.[6] Thus, Professor Barton's encouragement and assistance are at the foundation of Nuttall's "Genera of North American Plants" just as they are of Pursh's "Flora Americae Septentrionalis."

Nuttall has left us no autobiographical sketch, and the nearest approach to such is contained in the preface to his "North American Sylva," a passage clearly written in 1841. In a reminiscent mood the man of fifty-five says of his past experiences: "For thousands of miles my chief converse has been in the wilderness with the spontaneous productions of Nature; and the study of these objects and their contemplation has been to me a source of constant delight. This fervid curiosity led me to the banks of the Ohio, through the dark forests and brakes of the Mississippi, to the distant lakes of the northern frontier; through the wilds of Florida; far up the Red River and the Missouri, and through the territory of Arkansa; at last . . . across the arid plains of the far west, beyond the steppes of the Rocky Mountains, down the Oregon to the extended shores of the Pacific," and to California and the Hawaiian Islands. It has been difficult to form a chronological summary of all these journeys, but with evidence from various sources the sequence is becoming clear. One event is so prominent as to form a division between Nuttall's earlier and later travels; and so we may group them into two periods, those preceding and those subsequent to the publication of the "Genera of North American Plants" in 1818. That has remained Nuttall's most comprehensive work.

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[5] See Bartonia 9: 21-25. 1926 in account of "The elder Barton—his Plant-Collection and the Mystery of his Floras."

[6] For the two later years this is also shown by Barton's own statement reproduced in Appendix D, and which was published by William P. C. Barton in 1816. Among the documents found by Mrs. Delafield at Montgomery Place is a folded piece of brown paper labeled in B. S. Barton's handwriting: "Papers with Mr. Thomas Nuttall, and respecting his tour, &c.—Nothing else." This contains special papers concerned with Nuttall's journeys of the years mentioned, and some letters from him reporting his progress. For the opportunity of seeing these and for permission to reproduce passages from them, I am deeply grateful to Mrs. Delafield.

TRAVELS BEFORE 1818. Thomas Nuttall's publication of 1818, comprising two volumes with 570 pages of text, bore the full title: "The Genera of North American Plants, and a Catalogue of the Species to the Year 1817." Each genus was described and its scope stated; and although the author would have preferred to group the genera into natural families, he deferred to what was then the popular custom and kept them in the artificial classes of Linnaeus. But it is in the second theme of the title that our interest lies. Under each genus the component species were mentioned, but only novelties or other plants of special interest were actually described. It had been only four years since the appearance in England of Pursh's elaborate "Flora Americae Septentrionalis," and Nuttall considered this part of his own undertaking as directly supplemental to Pursh. Hence the passing of species with mere listing of names, hence the insertion of additional notes from his personal field-knowledge, and hence the describing of several hundred new species based upon later collections. The last, although including species founded upon specimens of Baldwin and others, were chiefly described from Nuttall's own discoveries.[7] Indeed, Nuttall's catalogue may quite properly be viewed as a summary of his own explorations up to the end of 1817.

The work does not contain any outline of the author's expeditions. But, when Nuttall published a new species, he tried to give a definite idea of its occurrence in nature. Similarly, he added geographical data concerning many other species. Sometimes this information is in the first person or else accompanied by the conventional "V. v.", meaning that the author had seen the plant living. Assembling such records I have obtained the framework of the picture of Nuttall's early travels as shown on the accompanying map. But there are many more records in the book which are not credited to other collectors, and which from their statements one suspects to be quite as definitely based upon Nuttall's own observations; these fall so definitely into the framework just formed as to leave no doubt that they are just as certainly his own collecting. From the disposition of these stations it becomes possible to formulate with fair probability Nuttall's routes of travel, evidence often confirmed and amplified by journals, letters, and other papers. Of course, the citations mentioned below are only a small portion of those in the book.

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[7] "To the names of species or genera proposed by the author, will be found an asterisk (*) prefixed." This symbol, which was adopted in nearly all of Nuttall's botanical works, is now reproduced so as to mark his own discoveries. As the reason for their mention is purely historical, the species will be cited under the names used by Nuttall, with little attempt to give later corrections.

But can not help toward this reconstruction be derived also from Nuttall's preserved herbarium specimens? Unfortunately, rarely is this possible. I have seen his labels accompanying specimens both in this country and in England—up to the publication of his " Genera " most of his types are in the herbarium of the Academy of Natural Sciences of Philadelphia. They bear but meagre data: just the name or abbreviation of the state, or other brief memorandum. Hence, the reconstruction now being attempted should yield long-needed information as to the actual sources of many of Nuttall's vaguely labeled specimens.

Near Philadelphia. At intervals from 1808 to 1818 Nuttall was resident in Philadelphia, and so we may first consider what places he visited on local excursions from this city. He hunted along the Schuylkill and the Wissahickon (" Wishahikon "), on the former getting *Asplenium *pinnatifidum, *Carya *microcarpa, Cerastium *glutinosum,* and *Scutellaria *gracilis,* on the latter *Dentaria *heterophylla.* There are records of many more plants as occurring near Philadelphia in Pennsylvania [8] or New Jersey. Thus, from the latter came *Myosotis *verna* and *Trichostema *linearis.* He knew the " sphagnous swamps " of what we call the " Pine Barrens," and there procured *Scheuchzeria palustris, Eriophorum *tenellum, Carex *collinsii,* and *Orchis *integra.* Egg Harbor [9] was the only locality mentioned on the coast of southern New Jersey, and there he got **Crantzia lineata, Polygonum *glaucum,* and *Amarantus *pumilus.* Others of his salt-marsh and seashore plants from New Jersey likely came from this part of the coast; such are *Aster *flexuosus, Atriplex *arenaria,* and *Hudsonia *tomentosa.*

Nuttall certainly visited New York City. His course thither was presumably by Trenton to New Brunswick, where along the Raritan (" Rariton ") River he got *Solidago squarrosa;* thence to Amboy, where he collected *S. *puberula;* thence by boat to New York City, near which he obtained along the Hudson River *Quercus bicolor *mollis* and on the salt-marshes of Long Island *Blitum *maritimum.* As there are no plants mentioned from New England, these localities were likely the limit of Nuttall's early travels toward the northeast.

South and southwest of Philadelphia the citations in the " Genera " show that Nuttall was early in southern Delaware and around Harper's Ferry on the Potomac River in the present West Virginia. From Sussex County, Delaware, are mentioned *Tofieldia pubescens* and *Lobelia *paludosa;* from Lewes (" Lewis-town "), *Martynia proboscidea;* and from the special locality of the Great Cypress Swamp, *Laurus carolinensis* (now a species of *Persea*). Among the Barton papers is a letter from him at " Lewes-town," dated June 16, 1809, telling of his trip by boat from Philadelphia, of visiting the Cape [Henlopen], of crossing afoot to Dagsboro (" Dagsbury ") and penetrating the great swamp, of the many plants obtained, and of the two boxes he was sending home. Harper's Ferry is on the road to the Shenandoah Valley where Professor Barton's brothers lived, and it had already been visited by Pursh in 1806; we have no evidence, however, that Nuttall visited it on Barton's behalf, but there he found *Anthopogon lepturoides, Quercus macrocarpa,* and *Q. olivaeformis,* nearby on the Shenandoah River *Paronychia dichotoma* and *Sedum pulchellum,* while just beyond at Shepherdstown is his eastern station for **Enslenia* **albida.* He seems to have been there late in the year, *Paronychia dichotoma* " flowering from August to November." [10]

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[8] Yet I doubt that he got any intimate knowledge of the territory back from the city in southeastern Pennsylvania, except as he crossed it to more distant points. Thus, he was seemingly ignorant of the peculiar flora of the Serpentine Barrens for he could remark about *Talinum teretifolium,* and *Gerardia auriculata* as well, that they had been found " by Dr. Darlington near Chester in Delaware," instead of " near West Chester in Pennsylvania." That this was not an accidental error is shown by its repetition, and, even though the latter was said to be based on another's information, the fact that it could pass the proofs to publication betrays lack of local geographical knowledge.

[9] Now Beesley's Point, on Great Egg Bay, behind Ocean City (See Witmer Stone in Rep. New Jersey State Mus. 1910: 799. 1911).

Niagara Trip for Barton. Professor Barton has preserved two other letters from Nuttall in 1809, and they show him to have been sent to western New York State whither Pursh had similarly gone in 1807. The first, from " Wilkesbarre " and dated August 10, tells of the plants seen on his trip thither via Bethlehem and over " Pokono " mountain. The second, from Canandaigua [New York] and dated October 10, after reporting nearly a month's sickness mostly at that place, tells of earlier being at Buffalo (" Buffaloe on the banks of the Erie "), of seeing the " Grand cataract of Niagara, the most astonishing production of nature," and then of proceeding " into Canada as far as Ancaster at the head of Lake Ontario," thence homeward via Queenston (" Queenstown "), Batavia, and LeRoy to Canandaigua. The letter is mostly filled with an account of the various plants collected. He is now sending a box with fossils and minerals as well as a few plant specimens, and speaks of a box of plants previously sent from Canandaigua. This expedition accounts for mention in the " Genera " of *Scolopendrium officinarum, Taxus canadensis,* and *Dentaria* **maxima* as seen in " the western parts of the state of New York " (the first showing that he must have visited Onondaga County), *Utricularia cornuta* "on the Table rock, at the Falls of Niagara," *Cleome dodecandra* on " shores of Lake Erie, near Buffaloe creek," and likely other plants credited to the " shores of Lake Erie." [11]

Northwestern Tour for Barton. The years 1810 and 1811 proved wonderful ones for Nuttall. Professor Barton sent him forth on a two-year project. This is Nuttall's " tour " concerning which Barton so carefully kept the papers.[12] In the little packet found by Mrs. Delafield are copies of the terms of agreement with Nuttall and of the directions given for his journey, a list of some articles supplied him, and copies of Barton's letters on his behalf to Albert Gallatin, Esq., Secretary of State, Washington, and to Governor Harrison at " Ft. Vincennes, on the Wabash." Excepting only the letters, these papers are of sufficient permanent interest to warrant their reproduction as an appendix to the present study. The letter to the Secretary of State asked for some general letter or passport for Nuttall, and Barton tells us that his request was answered by a special passport from President Madison. The letter to Governor Harrison has Barton's personal endorsement of Nuttall as " a young man, a native of England, brought up in a manner under my own eyes and instruction, and distinguished by his love of science, his integrity, his sobriety, and *innocence* of character." Professor Barton claims his share of credit for Nuttall's development.

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[10] Unless made in the autumn of 1808, it is difficult to fit in this visit at that season. As Nuttall's collection of *Paronychia dichotoma* (as *Anychia*) is alluded to by Elliott in April, 1817, it must have been gathered before that year.

[11] The record of *Melanthium* **glaucum* as from the " banks of the St. Laurence " would appear to mean along the chain of lakes and rivers representing the upper course of that river—a use of the phrase that is also found in his " Observations on the Geological Structure of the Valley of the Mississippi," of 1821. He was nearest the true St. Lawrence in 1809, but clearly could not have gone thither in the time otherwise unaccounted for. The journey was certainly made afoot.

The " Terms of Agreement " show how Nuttall was enabled to make the long journey, although they give no suggestion of the expected cost of the undertaking. The " Directions " state in detail the route he is to follow as closely as possible, and suggest many inquiries to be made in botany, geology, medicine, and the customs and languages of the Indian tribes encountered. Professor Barton says that he supplied Nuttall with " a considerable collection of ms. queries and memoranda," and evidently these queries are the ones referred to in connection with the Wyandot Indians.

The route outlined was sufficiently ambitious. He was to go from Philadelphia to Lancaster, Chambersburg, Bedford, and Pittsburgh; thence to Sandusky where lived the Wyandot tribe; thence to Detroit, and preferably overland with an Indian guide to Chicago; thence, so guided as was ever the expectation in the North-West, north along the western shore of Lake Michigan and west at latitude 44° N. to visit the Winnebagoes; thence along Green Bay to the Menominees, inland along the river of that name and across to Keweenaw Point on Lake Superior; thence to Fond du Lac at the western end of the Lake, and thence northeastward along the shore to the Grand Portage, just south of the Canadian boundary; thence by the Lake of the Woods to Lake Winnipeg, which seems to have been a principal goal of the journey; thence on northwestward to the Beaver River at 55° N. in the northern part of the present Saskatchewan, which was to be the uttermost joint of the journey. Somewhere in the far North-West, probably at one of the British factories, he was to winter. Returning he was to go southeastward to the Missouri River; thence he was to turn eastwardly so as to strike the upper course of the Mississippi River; thence to descend it to about the mouth of the Illinois River; thence eastward to Fort Vincennes on the Wabash River; thence through Kentucky or Tennessee to Virginia, where he was to visit the Peaks of Otter south of the James River and also Winchester in the Shenandoah Valley near which resided Barton's brother; thence to Philadelphia. The method of transport was not specified, but the course indicated required more travel by land than by water, and Nuttall seems to have been accustomed to make his journeys afoot rather than by horse.[13] At several points it involved geographical exploration, for even the headwaters of the Mississippi River were not accurately known, as this was before Long's Expedition thither. It meant passing among many tribes of Indians, some like the Sioux already hostile to the Whites. It was hardly the undertaking for a lone adventurer, but from the distance of Philadelphia neither Barton nor Nuttall seems to have realized this.

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[12] For Barton's own comment on this expedition, see Appendix D. Although the vital part of this statement was published as a footnote on pages 24 and 25 of Barton's obituary prepared by his nephew for the Philadelphia Medical Society, it seems to have remained unknown to those who have written about Nuttall—a not surprising result of both its manner and place of appearance.

It was in early or mid-April that Nuttall set forth. On April 22 he wrote home from Pittsburgh, and this preserved letter (marked "No I" by Barton) tells of the start of the great adventure. He rode to Pittsburgh on the stage, going through Lancaster, Carlisle,[14] Elizabeth-town, Harrisburgh on the Susquehanna, Chambersburg, McConnel's-town (evidently the present McConnellsburg), Bedford, Somerset, and over the Laurel-ridge to Greensburg. Plants seen along the way are mentioned, but at Bedford he failed to find any "organized impressions on stone." In Pittsburgh he has seen Mr. Stevenson, who has dissuaded him from going to Beaver Creek as "the salt springs are very inconsiderable;" accordingly he has sent his trunk by boat up to "Le Boeuf on the Alleghany" and "shall travel on foot" the "220 miles to Le Boeuf." I give this letter in such detail, not only to show his route, but also his manner of travel. He had to find conveyance for his scientific supplies, but he was ready to walk so as to collect plants on the way and, doubtless also, so as to conserve his funds. Unfortunately, this is the only letter from this journey as yet discovered, but elsewhere among Barton's papers perhaps there are still hiding more of these first-hand reports of Nuttall's two years of travel. Barton would have preserved them.

Fort Le Boeuf was actually on French Creek, a tributary that flows into the Allegheny River at the bend from west to south where stands the town of Franklin. Boats ascended the two streams to Le Boeuf, which stood very close to the present town of Waterford,[15] Erie County, Pennsylvania, from which in the old days portage was made to Presqu'Isle, at the present city of Erie. "Betwixt

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[13] Thus, his southern jonrney of 1830, made when Nuttall was forty-four years of age, was described by him as "a pedestrian tour of twelve hundred miles through the states of South Carolina, Georgia, Alabama and Florida." Trans. Amer. Philos. Soc. N. S. 4: 49. 1834. By that time he must have had long training in enforced economies, as surely these alone enabled him to travel so extensively.

[14] Apparently some place in Lancaster County, and not the present town of that name in Cumberland County, near or through which Nuttall must also have passed.

[15] Possibly identical with it as is suggested by the record of Nuttall's about to be mentioned. Forts LeBoeuf and Presqu' Isle had been built by the French to protect the portage.

Franklin and Waterford" Nuttall gathered *Euonymus *obovatus,* but his statement of the flowering season as June is surprising, for he must certainly have passed through in May. Perhaps he found the bush just coming into bloom, or perhaps by 1818 he had forgotten the month of his visit.

At Erie[16] Nuttall must have again sent his trunk ahead by boat to Sandusky, or perhaps directly to Detroit, but he himself made "a pedestrian tour round the greatest part of the southern shore of Lake Erie, to Detroit."[17] Presumably he busied himself at Sandusky with Dr. Barton's queries concerning the Wyandots, for on later expeditions we find him keenly interested in the Indians. In the "Genera" *Fragaria vesca* is mentioned as growing "in the state of Ohio near Lake Erie."

Near the outlet of Detroit River ("near the confluence of Huron river and Lake Erie") Nuttall gathered *Phalangium *esculentum* "in the spring of 1810." Then at "Detroit, Michigan Territory," he got *Tofieldia glutinosa, Nymphaea alba,* and *Rosa rubifolia,* all of which flower in June and early July, the evident time of his visit. At this point we find the first break with Barton's routing, and I suspect that here he first fully realized the fact that travel in the wilderness was so much more feasible by water than by land. Chicago was more accessible through Lakes Huron and Michigan, than by an overland trail; and also his supplies could be much more readily carried by boat. At any rate, he next says of himself: "I proceeded in a canoe along the . . . coast of the Huron lake to the island of Michilimakinak." On this island he gathered *Rubus *parviflorus* and *Tussilago palmata,* and in its vicinity *Juniperus *repens, Iris *lacustris,* and *Tanacetum *huronense,* while *Primula farinosa* was cited to the "calcareous gravelly shores of Lake Huron; around Michilimakinak, Bois Blanc, and St. Helena, in the outlet of Lake Michigan." On St. Helena he found *Calypso bulbosa,* but without flowers. In this section he would have first seen *Orchis *huronensis* "of the islands of Lakes Huron and Michigan," credited to August and September.

We do not know how early in 1810 Nuttall reached the Strait of Mackinac and the town of Mackinaw, both of which, as well as the island of Mackinac, were likely included in his term of "Michilimakinak." But whatever his date of arrival, his visit there certainly covered part of the time from July 22 to August 12, when the initial party of the overland Astorian expedition of the Pacific Fur Company was at that meeting of the waterways. Washington Irving in his "Astoria"[18] tells how this party, under the leadership of Wilson P. Hunt, had come from Montreal up the Ottawa River and by the fur traders' course through small lakes and rivers to Michilimackinac, and that they were at Mackinaw from July 22 to August 12 for Mr. Hunt to " complete his assortment of Indian goods and to increase his number of voyageurs," especially by the addition of some more experienced frontiersmen. The Astoria expedition was bound for the mouth of the Columbia River, to be reached by the route up the Missouri River opened by the Lewis and Clark expedition only six years previously. Irving says that Mr. Hunt offered Nuttall " the protection and facilities of his party,"[19] and the invitation must have thrilled the young botanist with the possibilities offered. It meant surety of passage to territory nearly unknown botanically, instead of the difficulties and uncertainties of the course he was upon. Also much of the territory that he had been sent to explore was relatively near the bend of the Missouri in what is now North Dakota, and his chance of reaching it would be improved rather than diminished. As the party was to winter near St. Louis, there was of course the fact that more would have to be crowded into the next year, but also the next year's season would begin earlier farther south. Above all, I fancy that he felt the hopelessness of carrying out his assigned project single-handed. Whatever may have been his motives—whether he relinquished the exploratory part of his commission at Michilimakinak or, as I suspect, at Fort Mandan the next summer—Nuttall decided to accompany the overland Astoria expedition up the Missouri River.

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[16] Here he collected *Ptelea trifoliata,* cited on page 190 of Torrey's "Flora of the Northern and Middle Sections of the United States," in 1824. This work mentions other of Nuttall's early collections, including several from the Falls of Niagara.

[17] In his "Observations on the Geological Structure of the Valley of the Mississippi," in Journ. Acad. Nat. Sci. Phila. 2: 14-52. 1821, Nuttall based generalizations on his own observations, and told where and when these had been made. On page 16 he outlined his journey through the Great Lakes, but by a slip of memory placed it a year too early, "In the summer of 1809."

[18] 1: 133-140. 1836.

But he had received special instructions to visit the Indian tribes of the Wisconsin country, so that, while Irving tells us that after August 12 the Astoria party under Mr. Hunt " pursued the usual route by Green Bay, Fox and Wisconsin Rivers, to Prairie du Chien, and thence down the Mississippi to St. Louis, where they landed on the third of September," I think that Nuttall tarried behind for these and botanical reasons. He says of his canoe journey from Michilimakinak: " I then took a southwest direction along the coast of Michigan to Green Bay; thence to the banks of the Mississippi, by ascending Fox River, near to its source, and, embarking on the Ouisconsin, which disembogues itself two miles below the village called Prairie du Chien." Thus he followed the same route as Mr. Hunt's party, but he evidently stopped among the Menominee Indians on Green Bay, for he tells of a piece of copper which was shown him " by a chief of the Monomonies," and his " Genera " mentions so many plants that his course could be reconstructed from their evidence alone. He crossed Wisconsin in September, that being the month assigned for *Artemisia *gnapholoides* and also seemingly for the finding of *Orchis *huronensis* on the islands of Lake Michigan. *Smilacina trifolia* and *Artemisia gnaphaloides* were gathered at Green Bay; the *Artemisia* and *Amorpha *canescens* on Fox River, the latter occurring " from the banks of Fox river and the Ouisconsin to the Mississippi." At Prairie du Chien he found certain far western species, most of which must have been now in fruit; *Batschia *longiflora, Pentstemon *grandiflorum, Euchroma *grandiflora,* and *Artemisia *serrata* were all seen again on the Missouri. Thence he descended the Mississippi to St. Louis.

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[19] " Astoria," 1: 151. The mention of Nuttall's presence occurs in recounting the personnel on starting up the Missouri River. As we shall see, that was the actual commencement of his travel with the expedition.

On arrival in St. Louis Nuttall found not only Mr. Hunt and his party but a fellow-botanist, John Bradbury, who had been sent out by the Liverpool Botanical Society to collect seeds and plants. Bradbury, who was then forty-two years of age, had reached the city on the last day of 1809, and had spent most of 1810 in exploring the country within 80 or 100 miles radius. Bradbury and Nuttall must have been quickly brought together by their common interests as well as nationality. During the late autumn of 1810 and the ensuing winter they likely made a number of excursions together. One such was to the Meramec River, as Nuttall speaks in 1821 about " the beautiful white and friable sandstone which has been observed near to a branch of the Merrimec by Mr. Bradbury and myself . . . in the winter of 1809."[20] Nuttall's " Genera " gives a number of species as first seen by Bradbury on this river, such as *Oenothera *alata* and *Donia squarrosa,* but *Psoralea *onobrychis* would seem to have been of Nuttall's own collecting, and, as it must have been gathered in the autumn, it is natural that he can describe only the fruiting plant. The relations between these two botanists, as is evident enough in reading Bradbury's " Travels," remained that of an incidental acquaintanceship which even their common interests failed to convert into a real comradeship.[21]

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[20] " Travels into the Arkansa Territory " 18. 1821. It is obvious that Nuttall has erroneously given the date as a year too early, just as in his " Observations on the Geological Structure of the Valley of the Mississippi " (also of 1821), he placed in 1809 the trip through the Great Lakes and in 1810 the ascent of the Missouri; see Journ. Acad. Nat. Sci. Phila. 2: 16 and 24. This lapse of memory may well have led Durand astray in also giving the year of Bradbury and Nuttall's journey up the Missouri River as 1810 instead of 1811 (as stated by Bradbury, Barton, Brackenridge, and Irving). Durand's error is however increased by his giving " the 31st of December, 1809 " as the day when Bradbury and Nuttall " started together from St. Louis with a party of traders and hunters " to ascend the Missouri; it would seem that the date must have been taken from the beginning of Bradbury's " Travels " where it is given as that on which he reached St. Louis for his year of residence there! Nuttall elsewhere stated the years correctly, commencing his account of *Collinsia* in Journ. Acad. Nat. Sci. Phila. 1: 189. 1817: " In the spring of 1810, during the course of an extensive journey into the northwestern interior of the territories of the United States;" and years later telling how he saw two whistling swans in domestication near St. Louis " in the winter of 1810 " (" Manual of Ornithology—Water Birds " 367. 1834.)

[21] A different tale is given by Durand. On Bradbury's arrival in this country (and presumably at Philadelphia) on his mission to collect in the interior " new objects of natural history," " Nuttall, with eagerness, embraced this opportunity to gratify his ardent desire for distant travelling, and his passion for the study of Nature; he offered to accompany Bradbury, and his request was accepted." The story has inherent difficulties, such as the unlikelihood of the young man of twenty-three, recently arrived in a new country, being in a financial position to make such a proposition. The narrative given in our text shows that the incident must be counted fictitious. Their association on the same journey was the result of a chance encounter, and both profited by similar generous offers from the leader of the Astoria expedition. Perhaps, since both had been sent on independent missions and were keenly desirous of gathering what was new to science, there was some jealousy between them.

As the story of the expedition up the Missouri River in 1811 has been well narrated by Bradbury [22] and by Irving,[23] with light upon it from H. M. Brackenridge, [24] who was with the boat of the Missouri Fur Company that was in charge of Manuel Lisa, its adventures need not be told anew. Our interest lies in an incidental aspect, the botanical activity abroad. We have glimpses given us of the two botanists. Bradbury was a man of poise and wide interests; he was a hunter and it is natural that he should have commanded the respect of all. Nuttall, of hardly more than half his companion's years, had an undisciplined scientific zeal. Irving tells how, "delighted with the treasures spreading themselves out before him, he went groping and stumbling along among a wilderness of sweets, forgetful of every thing but his immediate pursuit," a picture surely based upon Brackenridge's first-hand observation: "There is in company a gentleman [named] Nuttal, engaged in similar pursuits [as Bradbury] to which he appears singularly devoted, and which seem to absorb every thought so as to be troublesome to the company, which has sometimes to wait for him; it appears to have done away every regard for personal safety.—To the ignorant Canadian boatmen, who are unable to appreciate the science, it affords a subject of merriment; *le fou*, the fool, is the name by which he is commonly known. No sooner does the boat touch the shore, than he leaps out, and when his attention is arrested by a plant or flower, everything else is forgotten . . I hope, should this meet his eye, it will give no offence; for these things often constituted a jest between us." [25]

Both botanists obtained many specimens of plants, and later published records of them. Bradbury gave a list of about 100 plants as an appendix to his "Travels," but the localities for these are nearly all included among the numerous records in Nuttall's "Genera." That the latter's collections included also zoological specimens is evident from the insects described by Thomas Say in the first number of the Journal of the Academy of Natural Sciences in 1817, while his own "Observations on the Geological Structure of the Valley of the Mississippi" prove what attention he gave to mineralogy and geology. The route of the expedition can be followed on Bradbury's map, in comparison with modern ones, while its progress is also evident from Nuttall's citations of plants.

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[22] "Travels in the Interior of America in the Years 1809, 1810, and 1811." London, 1819. Reprinted as Volume 5 of "Early Western Travels," edited by R. G. Thwaites. Bradbury began his detailed narrative with the unexpected arrival at St. Louis of Mr. Hunt's party from Canada, and told how the leader kindly invited him to accompany it up the Missouri.

[23] "Astoria" 1: 152-235. Washington Irving, in preparing this account of a series of expeditions by land and by sea to the Columbia River, was supplied with the papers of Mr. Astor's company.

[24] "Journal of a Voyage up the River Missouri, performed in eighteen hundred and eleven." Published first in "Views of Louisiana," 199-267. Pittsburgh. 1814. Reprinted as Volume 6 of "Early Western Travels," edited by R. G. Thwaites.

[25] "Views of Louisiana" 240. 1814. The last sentence is from the "Journal," ed. II. p. 20. 1816.

In ascending a river by boat there is much more time for making collections than is possible during a descent. Irving tells us how the boats "had to be propelled by oars and setting poles," towed by a long line, or sometimes moved by sails. Travel would often be so slow as to provide a chance of walking long distances ashore or of cutting across bends of the river. But descending a river is speedy and a week's course upstream may be that of only a single day on the return. Hence, in considering where Nuttall collected, we need give our attention nearly wholly to his ascent of the Missouri.

Bradbury tells us how he and Nuttall left St. Louis at 2 A. M., March 13, 1811, joining Mr. Hunt at St. Charles; and with him and his Canadian boatmen they left St. Charles the next morning. The first plant, mentioned by Nuttall, appears to be the fern *Cheilanthes dealbata,* found in crevices of rock along the shore 50 miles up the Missouri. As this was so early in the year, it is not surprising that the next collections were made much farther upstream. It is from the entrance to the prairies and with the advance of spring that records of plants become numerous.

The next locality mentioned appears to be the " confluence of the Platte." On April 28 breakfast was eaten on one of the islands there, and slightly above that point a day and a half were occupied by the crew in cutting ashwood for oars and poles. Nuttall cites from the " confluence " or its vicinity a series of plants, mentioning for April *Anemone *ludoviciana,* for April and May *Euchroma *grandiflora,* for May *Orobus *longifolius.* Beside those found only here, many more are mentioned as occurring from here " to the Mountains " or " to the Northern Andes," while Irving says it was here that the boatmen considered that the Lower Missouri ended and the Upper Missouri began.

Next was the " Maha Village," where the party tarried from May 11 to 14. This, as shown upon Bradbury's map, was apparently in the present Omaha Reserve on the western (Nebraska) side of the Missouri some ten or twenty miles below Sioux City, Iowa. Nuttall mentions from it *Androsace occidentalis* (crediting it to April), and *Gaura *coccinea* (to May), the former extending " to the Mountains," and the latter " to the Mandans." Above Sioux City and a little below the present Yankton, South Dakota is the mouth of the James or " Jacques " River (" confluence of the Jauke "), passed about a week later; Nuttall mentions two plants as occurring from this section upstream, *Ferula *foeniculacea* and *Astragalus hypoglottis.* Next came the Niobrara River, known then by the French name of L'Eau qui Court, or Rapid River; there on May 24 were gathered *Evolvulus argenteus* and a *Cynoglossum.* Somewhere between the Platte River in Nebraska and the White River in South Dakota must be two streams that I have so far failed to locate: the Sawanee River at whose mouth was found *Phaca *caespitosa,* and Paint Creek similarly with *Stanleya pinnatifida;* both these plants were credited to May.

On the 26th, or more probably the 27th of May, the mouth of White River was passed. With regard to this tributary Nuttall follows an unusual procedure, citing plants according to the numbers of miles below its " confluence." This would harmonize better with observations made on a descent, but he is so explicit in giving flowering seasons of May (or June) to various species mentioned as to show that the collections must have been made on the ascent. The figures are in very general numbers. " Commencing 40 miles below the White river " is *Thapsia *glomerata;* " commencing about 30 miles below White River " is *Artemisia *columbiensis,* and on " dry and gravelly hills " at that distance is *Asclepias *lanuginosa;* " commencing about 15 miles below the confluence of White river " is *Atriplex *canescens;* while about the confluence are *Sophora *sericea* and *Oenothera *pinnatifida,* extending from there " to the Mandans " is *O. *caespitosa,* and " to the Mountains " *Astragalus *gracilis* and *Artemisia *longifolia.*

On June 1 the boats entered the Great Bend of the Missouri, called " Grand Detour " by the French. This is a remarkable loop midway between the White River and the present city of Pierre, South Dakota. Nuttall's species from this vicinity, so far as indicated credited to June, include *Crypsis *squarrosa, *Bartonia nuda, Myosotis *glomerata,* and *Senecio *integerrimus.*

Opposite the present Pierre, and so entering from the west, is a small river called on present maps the Bad, but known to Nuttall as the " Teeton " River. Its mouth must have been passed about June 4, and near it he gathered *Pulmonaria *marginata* and *Pentstemon *cristatum,* the latter occurring from this point " to the Mountains." Next came the Cheyenne (" Shian ") River, likewise entering from the west, the mouth of which was passed on June 8; here were obtained *Collomia linearis* and *Pentstemon *erianthera* [now called *P. glaber* Pursh, based upon Bradbury's collection], both credited to June.

On June 12 the Astoria expedition reached the Aricara villages (" Arikaree village "), just above the Grand River which enters the Missouri from the west near the northern border of South Dakota. Here horses had to be procured for the journey ahead, for Mr. Hunt had decided to proceed overland from this point so as to pass south of " the country infested by the Blackfeet." It was not until July 18 that the long overland course across to the Columbia River was begun. Irving tells us that on leaving the Arickara village, Mr. Hunt and his party left " Mr. Lisa and Mr. Nuttall there, where they intended to await the expected arrival of Mr. Henry from the Rocky Mountains " and that Bradbury and Brackenridge " had departed, some days previously, on a voyage down the river to St. Louis, with a detachment from Mr. Lisa's party." Brackenridge had come up the river with Lisa's boat, which, starting three weeks behind at St. Louis, had managed to overtake the Astoria expedition; and so he had shared the stay at the Aricara villages.

In spite of Irving's statement, Nuttall's records from the "Arikaree village" are few and do not suggest that much of his time was spent there. *Calymenia *pilosa* and *Collomia linearis* were evidently collected there and at that time. *Pentstemon *gracile* was seen in June "from the Arikarees to Fort Mandan."

In contrast, Nuttall's records from Fort Mandan are numerous, and the flowering seasons assigned to the plants are June, July, and August, showing that he was there several months. On the 19th of June Bradbury had started by horse for Fort Mandan, reaching there on the 22nd. Brackenridge and Nuttall followed in Lisa's boat, and arrived there on the 24th. On the 4th of July, as we are informed by Bradbury, Reuben Lewis (brother of Meriwether, and commander of the Fort), Brackenridge, Nuttall, and himself had dined by Lisa's invitation aboard his boat. There is ample evidence that Irving was mistaken in assuming that Nuttall had remained at the Aricara village.[26]

Fort Mandan, near the villages of the Mandan Indians, was not at the present town of Mandan, North Dakota, but was situated on the north side of the Missouri River in the present McLean County, and almost directly opposite the later Fort Clark.[27] To its vicinity the "Genera" credits, among many entries, *Lepturus *paniculatus, Kochia *dioica, Calymenia *decumbens, Paronycha *sessiliflora, Potentilla *humifusa, Orobus *dispar, Batschia *decumbens, Dracocephalum *parviflorum, Solanum *triflorum, *Orthocarpus *luteus, Orobanche *fasciculata, Sonchus *ludovicianus,* and *Trichophyllum *oppositifolium,* while *Fritillaria *alba, Lilium *andinum,* and *Cactus *fragilis* are given from this point "to the Mountains," and *Aronia *alnifolia* "to the Northern Andes." *Petalostemon *villosum* came from the Knife River, which enters the Missouri some miles above Fort Mandan, and from the west.

All the way from the Platte River to Fort Mandan Nuttall has been telling of plants that occur on "to the Mountains" or "to the Northern Andes." These terms are evidently synonymous, and the mountains indicated lie farther up the Missouri River, but they can not be the actual Rocky Mountains for Nuttall cites no more tributary rivers above Knife River and he could not conceivably have crossed what is now Montana to the ranges known to Lewis and Clark. Those explorers had however described the country from the Mandan villages to the Little Missouri River as "hilly and irregular," while just below the mouth of that stream was "a high range of hills to the south side." I suppose that Nuttall must have ascended the Missouri through this rough country, until he came to where the plain that had seemed illimitable from the top of the river's bluffs at last found an end in real hills and mountains. It was no more than the northern extension of the Bad Lands and certainly could make but feeble claim to the imposing term "Northern Andes," but Nuttall evidently viewed it as an outlier of a great western mountain-system, continuous through both Americas. In reality, it did form an obvious limit to the ranges of the species he had been seeing.

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[26] Irving's date for Brackenridge and Bradbury's departure for St. Louis also needs slight correction, as, after returning from Fort Mandan in Lisa's boat, the latter says that they left on July 17, only one day before the departure of Mr. Hunt's party. As Bradbury's "Travels" are really the dated records in his journal, its chronology is particularly accurate.

[27] Wheeler, O. D., "The Trail of Lewis and Clark" 1: 196. 1904.

At Fort Mandan Nuttall was in a good geographical position to attempt to carry out Professor Barton's directions to go either to Lake Winnipeg or else to the upper Mississippi River. Lewis and Clark's map [28] shows us how imperfectly the country was known in either direction. If Nuttall had contemplated attempting either course, he may well have abandoned the thought on realizing the fierceness of many of the Plains' Indians. He found that the Sioux were particularly dreaded, and the route to the Mississippi would have had to cross their territory. It would be foolhardy to attempt either project alone, nor would it be scientifically wise as on the Missouri River he found himself in a flora composed very largely of species wholly unknown. So he zealously kept to his botany, and, while he likely obtained for Dr. Barton data about the Indians, the accounts we have quoted show that this must have been a subordinate interest.

How long did Nuttall remain in the Mandan country? Flowering dates for plants are given to September, and many seeds were gathered in that section. Mr. Lisa, who had been joined by Mr. Henry as anticipated, went down the river so as to arrive at St. Louis about the end of October.[29] Brackenridge tells us that "Mr. Nuttal, who had chosen to remain sometime longer with Lisa, had also returned;" while Professor Barton, getting his information from Nuttall, says that "in the boat of a Spanish gentleman," who was clearly Manuel Lisa, a Spaniard by birth, he "descended the Missouri to St. Louis . . . in the autumn of 1811." (See Appendix D.) As the trip downstream would be so rapid, I presume that Nuttall remained in the Mandan country until frost. It must have been during his solitary journeys out from Fort Mandan that he experienced those hardships of which he would tell in later years—there must be some truth behind Durand's tale: "As for Nuttall, overcome by fatigue and hunger, driven to despair in the midst of the wilderness, and unable to go a step farther, he laid himself down with resignation and would inevitably have died, had he not been found by a friendly Indian, who placed him in his canoe and rowed him down the Missouri River to the first settlements of the white men." Perhaps this, an experience also related by Meehan's informant, was his return from the "mountains" to Fort Mandan.

Nuttall reached St. Louis again in time to have seen Bradbury, and one wonders whether they might have journeyed down the Mississippi River together, although Bradbury's silence is against the likelihood of this. The latter left on

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[28] "History of the Expedition under . . . Lewis and Clark" . . . edited by Paul Allen, Philadelphia, 1814.

[29] Brackenridge's "Travels" p. 203. 1816. Bradbury (p. 201) places it early in November, but according to a visit received from Mr. Lisa, which may not have occurred until a while after the latter's return.

December 5, reaching New Orleans on January 13, 1812; thence he would seem to have dispatched his collections directly to England,[30] and on the 20th of January set sail for New York. Nuttall also descended to New Orleans " in the latter end of the year 1811," as Professor Barton phrases it. In the " Genera " we can trace his progress, and the absence of records from the upper part of the course is explained by his having passed in winter. There he must have stopped at the mouth of the Ohio River, however, as he reports seeing *Phalangium *esculentum* as " very plentiful on the lowest banks of the Ohio." He tells us of various plants seen along the Mississippi River, but the next definite records are from Natchez, Mississippi. *Bumelia *oblongifolia,* " first noticed by J. Bradbury near .... St. Louis on the Mississippi, is also abundant as far down the river as Natchez "—the latter clearly Nuttall's own observation; but " the *B. serrata,* inadvertently described by Mr. Pursh, was nothing more than a young branch of the *Prunus caroliniana* without flowers, which I had collected near the town of Natchez on the Mississippi." This suggests the beginning of the southern spring, January or February. At Natchez Nuttall also gathered *Hydrangea quercifolia,* while *Cacalia *tuberosa* flowered in London in the summer of 1813 " from roots which I had collected at Natchez." *Erigeron divaricatum* he seems to have observed along the Mississippi from St. Louis to New Orleans. " On the banks of the Mississippi, near New Orleans," Nuttall gathered **Oxydenia *attenuata,* and around that city *Clitoria plumieri, Sesbania macrocarpa, Rhamnus lanceolatus,* and *Senecio lobatus.*

England (1812-1814). At New Orleans, early in 1812, Nuttall again chose between two courses. His contract with Professor Barton called definitely for returning to Philadelphia and delivering his precious collections, of which he had been duly promised a share. But it may be that he was alarmed by the increasingly hostile sentiment toward England, or it is possible that he may have felt that his departure from the " Directions " given him was too flagrant for easy reconciliation; also, he may have realized that for the naming of such collections as he had with him he needed access to larger herbaria and libraries than our country could yet supply. Whatever the motives, he broke still further with his agreement, and sailed directly for England. Professor Barton, in telling of it, says that "previously to his departure, he transmitted to me a number of the dried specimens and seeds which he had collected," and at the same time he sent a manuscript book containing at least some plant descriptions. Nuttall was more fortunate than Bradbury in that, when the war came, he was on the home side of the ocean and able to prosecute diligently the naming of his plants. I think that, while he was there, he felt himself still bound by the agreement with his American patron.

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[30] Of his collection Bradbury speaks in the preface to his " Travels." " When embarked on the Missouri, at the Aricara nation . . . [it] was extensive; but being then two thousand nine hundred miles from New Orleans, the losses by the way, and during my subsequent sickness at St. Louis, greatly diminished it." Then came the war of 1812, delaying Bradbury's return to England, but his specimens had evidently gone thither, for on his eventual return, full of plans for preparing some work about them, he says: " I found that my design was frustrated, by my collection having been submitted to the inspection of a person of the name of Pursh, who has published the most interesting of my plants in an appendix to the Flora Americae Septentrionalis." Those specimens which were studied by Pursh seem to be all that were ever reported upon; they passed into the herbarium of A. B. Lambert, whose large collections were sold by auction piecemeal after his death in 1842. While Bradbury's specimens may then have become widely dispersed, the largest series that I have yet discovered is at the Academy in Philadelphia. Like other specimens evidently from the same source and acquired at the same time, they had been mounted while in the Lambert Herbarium upon small sheets of a characteristic paper which bear on the reverse in the upper right-hand corner data in Lambert's handwriting. Eighteen species have been recently reported by H. W. Rickett as at the herbarium of Kew Gardens, and (in Kew Bull. Misc. Inform. 1934: 49-61) he has given some notes and an itinerary of Bradbury's journey.

The War of 1812 was declared on June 18 of that year and the treaty of peace that ended it was not signed until December 24, 1814. During all that time we may be sure that Nuttall remained in England, while Bradbury was waiting impatiently in this country for an opportunity to follow whither his specimens had gone. Meanwhile in England, with the patronage of Aylmer Bourke Lambert and presumably working at his estate at Boyton near London, Frederick Pursh was completing his "Flora Americae Septentrionalis," publishing it in 1814. He made a systematic effort to consult all material available in England, although the tense relations of that country with France doubtless prevented his consulting Michaux's collections in Paris. He saw Bradbury's plants "through the kindness of William Roscoe," and described many new species from the "Banks of the Missouri" in a supplement to his text. He likely approached Nuttall with the hope of adding species from the latter's thorough collection, and we may suppose that he felt the more confident of success because of their common indebtedness to Professor Barton. But Nuttall seems to have communicated little, and Pursh's "Flora" contains only 15 species cited to Nuttall's herbarium ("V.s. in Herb. Nuttall"), all of which are from the Missouri River. Only a part of these were new to science, and Nuttall's remark concerning *Bumelia serrata* having been "inadvertently described by Mr. Pursh" makes me suspect that he was unaware that any of these were to appear in Pursh's book. Nuttall's incommunicativeness may in good part have been due to obligation toward Barton, although he gives another reason in his comment on *Bartonia.*

Nuttall desired to honor his American patron by dedicating to him some grander namesake than the obscure Gentianaceous plant which Muhlenberg had already called *Bartonia.* This desire he now shared with Pursh, apparently even to sending him the notes made from the living plant when on the Missouri. The plant soon appeared in color in the Botanical Magazine, but as the genus *Bartonia* of Pursh (instead of Nuttall) and the species *B. decapetala* Pursh, in place of the intended *B. superba* Nutt.[31] This theft of credit due to Nuttall so stirred

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[31] Tab. 1487. Aug. 1, 1812. At the conclusion we read: "For the above generic and specific characters, and indeed the whole communication, we are indebted to Mr. Frederick Pursh." Clearly he, and not the editor John Sims, is bibliographically responsible for the

Dr. Barton, that only three days before his death in December, 1815 he wrote the dissertation on _Bartonia_ reproduced in part as our Appendix D. In it his sympathies are vigorously with the younger botanist, for the incident has afforded him " an opportunity of doing some justice to the zeal and services of Mr. Nuttall, who has contributed essentially to extend our knowledge of the North-Western and Western Flora of North America; and to whom the work of Frederick Pursh is under infinite obligations." In commenting on _Bartonia_ in his " Genera " Nuttall alludes to the impossibility of Pursh's having been able to describe this plant on his own account from Lewis's specimen of 1807 as that was " merely an imperfect capsule," and remarks concerning Pursh's conduct: " This unfortunate want of fidelity, prevented me from communicating to Mr. Pursh, many of the plants which now appear in this work." Nuttall's course neither warrants Barton's claim of Pursh's deep indebtedness to him, nor Barton's plaint that in England " to Mr. Pursh, among others, [Nuttall] communicated what knowledge he possessed of the new American plants and likewise furnished this botanist with dried specimens of them "—clearly in direct violation of the signed terms of agreement. It is a situation in which we wonder whether Nuttall's course was due more to loyalty to Barton or to his own interests.

The situation was complicated both by the fact that war had intervened to prevent Nuttall's return to Philadelphia, and also by the necessity of planting at once the many seeds that had been collected on the Missouri. Most of these went to the Fraser Nursery at London, and for that firm Nuttall prepared a catalogue [32] that was issued in 1813. It listed 89 species, largely new to science, and gave the following data: " * New Species — † A Shrub — ‡ Perennial. — M. from the Missourie." Between August, 1812 and November, 1816 at least 10 species, mostly from the Fraser establishment, were illustrated in the Botanical Magazine. But Nuttall also presented plants to the Botanic Garden of Liverpool, under the care of John Shepherd, to whom in 1818 he dedicated the genus *_Shepherdia;_ and further, he changed his earlier name of _Pentstemon_ *_angustifolium_ to _P._ *_caeruleum_ on " my becoming acquainted with the flower, which Mr. Shepherd obtained from a plant that I had presented to the Botanic garden of Liverpool." The

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names. The source was stated: " Living plants have been brought to this country, by Mr. Thomas Nuttall, who collected them . . . in the neighbourhood of the Missouri . . . [from] the river Platt to the Andes." Nuttall however had brought home merely seeds and specimens, as is evident from a footnote to be given in Appendix D, of which I quote now these remarks from his letter to Barton: " In the . . . Botanical Magazine, tab. 1487, I did myself the pleasure of giving your name to a very splendid plant, which was figured from a dried specimen; and it afterwards flowered with me from seeds. A Mr. Pursh . . . has in my absence . . . taken his opportunity of advertising himself at my expense, at the close of my communication."

[32] " A Catalogue of New and Interesting Plants, collected in Upper Louisiana, and principally on the River Missourie, North America. For sale at Messrs. Fraser's Nursery for Curious American plants, Sloane Square, King's Road, Chelsea, London 1813." The Academy's copy has inserted in Nuttall's handwriting after the title: " By T. Nuttall," and was addressed by him to " Z. Collins, Esq., Philadelphia."

account of *Petalostemum violaceum* in the Botanical Magazine[33] reads: "We received living specimens from [Thomas Nuttal] in the autumn of 1813, which flowered in the open ground near Liverpool," probably also a record of something grown in the Liverpool Botanic Garden; although the illustration of the plant was not made until October, 1815 at "Fraser's American Nursery." The entry under the *Penstemon* implies further that Nuttall had presented the living plant, and hence that he had grown the seeds himself.

Where was Nuttall staying during this period in England? Part of the time he was at Sutton[34] in Lancashire, from which he wrote in February, 1813 to Dr. Barton, and I suppose that it was here that he had his garden. But much of his time must have been spent in London, and presumably working at the British Museum. He speaks of becoming "accidentally acquainted in London" with Pursh. On January 19, 1813 he was elected a Fellow of the Linnean Society. The diligence of his work identifying his own collections is shown by the number of new species ascertained by the date of Fraser's Catalogue in 1813. Indeed, the comparing of species and the formation of descriptions for the "Genera of North American Plants" of 1818 may have been largely achieved from 1812 to 1814 in England.

Southern Journey (1815). Sometime in 1815 Thomas Nuttall returned to the United States. Did he come at once to Philadelphia, and in expectation of seeing Professor Barton? We know, from his nephew, that the latter "embarked for France in the month of April 1815, and returned by the way of England in November following," so that he was absent for seven months. Nuttall might have arrived before he left, but it is just as likely that they did not meet, if at all, until Barton's return. By the time of Barton's visit to England it would be probably late summer, and by that time Nuttall was already on a trip to our southern states.

That such a journey took place that year is proved by a letter from Dr. William Baldwin, from "Savannah, April 23, 1816," which alludes to "Mr. Nuttall, an English botanist, who paid us a visit last fall."[35] Baldwin remained in Savannah until the beginning of 1817, and in January chanced to allude to what Mr. Nuttall had told him "a year ago;" so that it hardly seems probable that Nuttall came that way again. Accordingly, we may consider that his early collections from Georgia all date from 1815. The list of species suggests the end of summer or early autumn.[36]

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[33] Tab. 1707, dated February 1, 1816. The spelling of Nuttall's name as "Nuttal" in this and other numbers of this journal, as it was in the narrative of Brackenridge, shows that the accent was on the first syllable. It was so placed in Lippincott's "Pronouncing Dictionary of Biography," a work prepared in Philadelphia before 1870 and which doubtless depended for this detail on those who knew the botanist personally.

[34] This "Sutton" is about a mile and a half northeast of Rainhill, the place where Nutgrove, the estate of Nuttall's brother Jonas, is usually said to have been, and Thomas was probably living with his brother at that time, in the house where he was to spend the last years of his life. Nutgrove may have been nearer to Sutton than to Rainhill.—J. H. BARNHART.

[35] Darlington's "Reliquiae Baldwinianae" 184. 1843.

In the " Genera " we find many species mentioned as observed near Savannah, Georgia. Among them are *Hydrocharis *cordifolia, Zizania fluitans* (" pointed out to me by Dr. Baldwyn "), **Triphora pendula, Nuphar sagittaefolia, Schisandra coccinea, Lupinus villosus, Tephrosia *prostrata, Tribulus *trijugatus, Prinos *atomarius, Rhexia *angustifolia, Vernonia *altissima, Inula scabra, I. *divaricata,* and *I. *obovata.* He went inland to Augusta, between Savannah and Augusta getting *Lindernia *grandiflora,*[37] and near Augusta *Aristida *tuberculosa, Nolina georgiana, Chyrsobalanus oblongifolius,* and *Ceratiola ericoides.* Nuttall's travels before 1818 did not pass beyond the vicinity of the Savannah River in Georgia, while just across the St. Mary's River lay Florida which was still Spanish territory; his Florida records were mostly derived from William Baldwin (" Baldwyn ").

Baldwin's letter, mentioned above, said that Nuttall left Savannah for Philadelphia. But he evidently broke his boat journey at Wilmington, North Carolina. Just as the Savannah collections pertain to early autumn, so do those of Wilmington pertain to middle and late autumn. They include *Pleea tenuifolia, Tofieldia *glabra, Lupinus *diffusus, Oenothera *riparia, Chelone obliqua* (as *C. lyoni*), *Gerardia *linifolia, G. *aphylla, Liatris bellidifolia,* and *Inula gossypina.* Evidently he tramped inland for of the Venus fly-trap, *Dionaea muscipula,* he says: " No where more abundant than round Wilmington," and adds: " I have traced it for 50 miles north of that place," thus showing that he had gone far in that direction. But I do not think that he went into Virginia, for in giving the northern limit of the Spanish mass, *Tillandsia usneoides,* he is content to quote Pursh's observations there. Years later he reported finding *Liatris *virgata* at Newbern,[38] which would likely have been procured in 1815. If so, it was from there or Beaufort that he would have taken the boat on to Philadelphia, arriving likely in November.

Philadelphia (1815-1816). It was in November, 1815 that Professor Barton returned to this country, and likely not until December to our city; one wonders if Nuttall came to meet him during the last weeks of his life. The young man must have been forming plans, and may well have laid before his former patron some project for a flora superior to that of Pursh. Perhaps Nuttall's autumn in the South had been once more travel supported by Barton. I think these things unlikely, judging by the tone of Barton's last communication published as our Appendix D. But it must be realized that the atmosphere of the "Bartonia memoir" is distinctly friendly to Nuttall. However these things be, it seems probable that Nuttall was again in Philadelphia at the time of Barton's death on December 19, 1815.

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[36] Nuttall's " Genera " omits flowering seasons for southern plants, so we lack the record of months in checking his travels.

[37] Recently, in Monog. Acad. Nat. Sci. Phila. 1: 159. 1935, I have questioned the authenticity of this record, because all subsequent specimens of the plant have come from peninsular Florida. Nuttall gave the environment and added: " Betwixt Savannah and Augusta in many places; " and his type at the Philadelphia Academy says " Georgia." The present investigation shows that if Nuttall himself collected the plant, it could not have come from south of the district indicated and should be found again near the Savannah River; but I suspect that there has been some confusion of material and that the plant was really gathered in Florida by Baldwin. But that the course between these cities was certainly traveled by Nuttall in 1815 is further proved by his allusion, when telling of being in South Carolina in 1816, to having taken " a former route, from Savannah to Augusta, in Georgia." (Journ. Acad. Nat. Sci. Phila. 3: 40. 1821.)

[38] Trans. Amer. Philos. Soc. N. S. 7: 284. 1841.

That event released Nuttall from his obligations to his former patron, but it also faced him with the necessity of making his own plans to fit what resources he could now attract to his undertakings. From this time on, we may be sure that he must have been deciding upon the form and drawing up the actual text of "The Genera of North American Plants." This second period in Philadelphia was different from that seven years earlier, for now he was known scientifically as a successful botanical explorer. Recognition came in membership both in the Academy of Natural Sciences and the American Philosophical Society. To the latter he was elected in October, 1817, at the same meeting with Thomas Say and Lewis David von Schweinitz; to the former earlier in the year, and in such a manner as to make me suspect that he was then absent on another journey.[39] Nuttall contributed several papers to the first volume of the Academy's "Journal" in 1817, and soon became the main developer of our plant collections.

Southern Journey (1816). This, the last long journey before the publication of his first comprehensive work, was clearly one of Nuttall's larger undertakings, but his route must be sketched from incidental allusions and references, and from the internal evidence of the "Genera."

Nuttall seems to have left Philadelphia probably in late April or May, taking again the road to Pittsburgh, and it may have been on this trip that *Orchis dilatata* was gathered in Franklin County, Pennsylvania. Instead of going directly, he seems to have headed across to the Allegheny River and after a detour of more than 100 miles reached Pittsburgh in early June.[40] Then he started down the Ohio River by boat, presumably in a small skiff such as he used two years later. *Dracocephalum *cordatum* was collected in June on "shady islands of the Ohio, about 40 miles below Pittsburgh;" *Hesperis pinnatifida* "on the banks of the Ohio from Le Tart's rapids downwards," this locality being at the present Letart in Mason County, West Virginia; *Podostemum ceratophyllum* in the Kanawha ("Kenhaway") River; and the much desired **Collinsia *verna* in fruit "on descending the Ohio . . . nearly to Galiopolis [now Gallipolis]." He must have gone somewhat up a tributary to have gathered **Enslenia *albida* on the "banks of the river Scioto."

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[39] On January 28, 1817 he was elected a Corresponding Member of the Academy, a class to which no resident of Philadelphia was eligible. He was entered as "Thomas Sutton Nuttall," probably by confusing the place Sutton in Lancashire, England, perhaps given as an address, with his personal name. But in the Academy's book of membership he signed the roll of Active Members, calling himself "Thomas Nuttall." The situation is one which would be much more likely to occur, if Nuttall had been absent at the time of his election.

[40] In telling his experiences in search of *Collinsia* (Journ. Acad. Nat. Sci. Phila. 1: 189. 1817) he said: "In the spring of last year (1816) having undertaken a tour to the western states, I determined, if possible, again to collect this neglected plant, but after a journey of more than a hundred miles, for scarcely any other purpose, I arrived at Pittsburgh disappointed of my object." As "in the spring of 1810" he had obtained specimens (later lost) "on the alluvial soils of the Alleghany and on the borders of lake Erie," there can be no doubt that this detour of 1816 took him up the Allegheny River. Although the distribution of *C. verna* would lead one to expect it there, this species seems never to have been gotten again along that stream; see map 81 in Monog. Acad. Nat. Sci. Phila. 1: 295. 1935.

At Cincinnati the boat journey would seem to have terminated. There Nuttall made the acquaintance of Dr. Daniel Drake, whom in his "Journal" of two years later he called "one of the most scientific men west of the Alleghany mountains;" and also of Dr. Charles W. Short. Twenty years later the latter recalled "the happiness of making . . . several herborizations" with Nuttall "in 1816" and said that "at that time, in addition to his zeal for botanical acquisitions, he was much interested in the examination of the aboriginal relics of this region, and we assisted him in taking plans and measurements of an extensive fortification at the confluence of the great Miami and Ohio rivers, and of another near [Lexington]."[41] Nuttall appears to have been in Cincinnati about the end of June and in early July, for **Synandra *grandiflora* was hesitantly credited to the former, and *Seymeria *macrophylla* at the nearby town of Lebanon positively to the latter, month. From Cincinnati his journey was certainly pedestrian.

Passing southward into Kentucky, *Hedysarum *pauciflorum,* a species of tick-trefoil, was noted as "common around Lexington." Dr. Short tells also of being with Nuttall there. The knowledge Nuttall displays concerning the limestone areas of central and southern Kentucky makes me suspect that in August he went southwestward to the Green River section. *Pycnanthemum *pilosum* and *Aster *gracilis* are credited respectively to the "glades" and "savannahs" of both Kentucky and Tennessee—probably at the beginning of September he was in the "Cedar Glades." Thence he seems to have traveled up along the Cumberland River; there making his first observation of *Magnolia macrophylla* and on the definite date of September 9 seeing semipalmated ring plovers.[42] He seems to have continued up the river valley to Cumberland Gap.[43]

From Cumberland Gap Nuttall seems to have crossed directly to the bend of the French Broad River, getting *Podostemum* in the Holston River and again in the French Broad. Then he ascended the latter river, finding about the mouth of "Pidgeon" River *Houstonia *tenuifolia,* near the Warm Springs *Paronychia*

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[41] "A Sketch of the Progress of Botany in Western America," p. 15. From Transylvania Jour. Medic., vol. 34. 1836; reprinted in Journ. Bot. 3: 109. 1841, the page being that of the reference to Nuttall.

[42] "Manual of Ornithology—Water Birds" 25. 1834.

[43] Personal observation seems evident in the geological remark: "The similarity of this . . . formation . . . in East Tennessee, as it appears after crossing the Cumberland Gap, is deserving of attention." Journ. Acad. Nat. Sci. Phila. 2: 26. 1821.

argyrocoma and *Philadelphus *hirsutus,* and at Asheville (" Ashville "), North Carolina, *Aster *montanus.* Thence in late September or October he crossed the Blue Ridge, known to him as the Catawba Ridge, to the headwaters of the Catawba River. He climbed some of the highest summits, getting *Abies balsamea fraseri, Xerophyllum asphodeloides, Ledum buxifolium* (in fruit), and, especially on the " romantic summit of Table Rock," *Hudsonia *montana* (in flower and fruit).

East of the Catawba Ridge Nuttall came down to Morganton (" Morgantown ") on the Catawba River, getting in the stream itself *Podostemum* again, and elsewhere *Aster *montanus* and **Gyromia *picta* (in fruit—a plant now restored to *Medeola*). He appears to have gone next to Lincolnton, as 12 miles southeast of that place he carefully examined the very limited occurrence of *Magnolia macrophylla.* I presume that southeast of this again, near the South Carolina line, is the " ' Flat-Rock ' above Camden in North Carolina," where *Tillaea cymosa* was obtained " in winter."

Thence he proceeded coastward, evidently following near the Catawba River, to Camden, South Carolina. That his course lay in this direction is proved by his remarks concerning the distribution of the Spanish moss, *Tillandsia usneoides*: " Crossing North Carolina and proceeding towards Charleston, I have observed its western limits . . . to be at Camden in South Carolina." That the year was certainly 1816 and therefore that this Carolina traverse is definitely part of the same expedition as the experiences in Kentucky and Tennessee is shown by the following excerpt from Nuttall's geological report of 1821, which supplies all the detail available as to the further course to Charleston: " In 1816, while proceeding through North and South Carolina to the city of Charleston, I remarked the first appearance of this floetz in the immediate neighborhood of Statesborough,[44] in South Carolina, near the commencement of the hills of Santee. . . . From hence, to the little town of Manchester, there intervenes a succession of . . . . hills . . . . Eighty miles from Charleston, along what is called the river-road, on the high and sandy banks of the stream produced by the Drowning Spring, I noticed . . . At Nelson's Ferry, on the south side of the Santee, I again observed. . . ." He must have reached Charleston in the winter, December or January, and there I have only noted his record of *Castanea *alnifolia.*

That Nuttall visited Stephen Elliott in Charleston is evident by such a record as that of *Malope malacoides,* marked " v. s. in the herbarium of Stephen Eliot, Esq., Charleston." It was likely then, and personally from his visitor, that Elliott gathered the information for his two references to Nuttall that precede the publication of the latter's " Genera." In discussing *Anychia argyrocoma?* in his " Sketch of the Botany of South Carolina and Georgia " Elliott says that

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[44] Near Horatio, Sumter County, and not far south of Camden, Kershaw County. This place is probably intended in giving *Kalmia cuneata* an occurrence " betwixt Camden and Statesville, South Carolina."

"Mr. Nuttall has lately informed me that he has found in Tennessee a species agreeing more minutely with Michaux's argyrocoma than the one above described;" this part was apparently published in April, 1817 and the passage recalls Nuttall's visit of several month's past, as doubtless does also the second reference later in the year to *Pleea tenuifolia* having been found at "Wilmington, North-Carolina; M. Nuttal."[45]

This expedition of about eight months in 1816 and the beginning of 1817 completes the number of collecting journeys, that I suggest as having taken place before 1818. It leaves some problems unsolved. At Savannah Nuttall's record would lead one to suppose that he had gotten in flower the vernal *Gelsemium nitidum *inodorum,* but he does not claim to have seen this living, and I suspect that he has inadvertently omitted crediting the plant to Baldwin. More difficult are the records of spring and early summer plants from the southern Appalachians. *Hudsonia montana* from Table Rock, North Carolina, and *Philadelphus hirsutus* and *Houstonia tenuifolia* are not to be expected so late as the time I have given for Nuttall's passage. I think that these must all represent the autumn flowering of vernal species, since these localities lie exactly on the course that we feel certain Nuttall followed. This seems more likely than that there was some other southern expedition, which we are unable to trace elsewhere by its records.[46]

Philadelphia (1817-1818). On Nuttall's return by boat from Charleston to Philadelphia early in 1817, it would seem obvious that he settled down to concentrated work producing the text of "The Genera of North American Plants, and a Catalogue of the Species to the Year 1817." Meehan's informant says that "during the preparation of this work he spent nearly two years at the Academy of Natural Sciences in Philadelphia, studying and identifying his plants, often remaining up all night, and when tired lying down under the bones of the great Mastodon for repose." The two volumes of the work comprise more than 580 pages, largely set up in fine type. The title-page states that the work was

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[45] "Sketch" 1: 308 and 465. Between Nuttall's visit and April there was apparently time for him to have returned to Philadelphia, to have sent Elliott specimens of *Paronychia dichotoma* from a collection once made at Harper's Ferry, and for Elliott's comment to have passed through press. The second reference affords proof that the visit to Wilmington occurred in 1815, as in all his other autumns Nuttall is known to have been elsewhere.

[46] Durand's account of the period from Nuttall's return from the Missouri expedition to the publishing of his "Genera," bears little resemblance to what I have been sketching: "Nuttall returned to Philadelphia from this journey up the Missouri, in the beginning of 1811, bringing with him ample treasures of plants, seeds, minerals, and other objects of natural history. For eight consecutive years, he remained settled in our city, occupying his summer months in botanical excursions to the banks of the Ohio, through the dark forests and brakes of the Mississippi, to the distant lakes of the northern frontier, through the wilds of Florida, &c. During the inclement season, he employed his time in studying his collections, and preparing his materials for his admirable work, 'The Genera of the North American Plants.'" Durand erred in the year of Nuttall's return from the Missouri, in omitting his subsequent visit to England (whither he went instead of to Philadelphia), and in assigning to these years his experiences on the Great Lakes and the Mississippi (which belonged to the Missouri expedition) and his visit to Florida (which did not occur until 1830).

"printed for the author by D. Heartt" at Philadelphia, but Durand doubtless hands on a correct tradition when he speaks of Nuttall himself working on the task, though perhaps the amount of his labor is overstated. He says: "It is well known that he set up himself the best part of the types, and such was his accuracy in type composition, that some parts of his work were set up without a single error, and others, even without copy, reduced to writing." I suppose that this task lasted through most of 1817 as well as 1818, and that actually about a year and a half's steady toil was given to it. At last all was finished by the autumn of 1818.

The work has a brief preface which makes no acknowledgments of indebtedness. There is also a dedication, but it is not to the memory of Professor Benjamin Smith Barton, as would seem most appropriate, but "to his Excellency, Joseph Correa de Serra." The latter was at the time Portuguese Minister to the United States, but he had earlier been long in Philadelphia as a political exile, and had made his influence felt in the scientific life of this city and nation. We shall find him one of the financial contributors to Nuttall's next extensive collecting project, and I suspect that his name at the commencement of Nuttall's "Genera" means that Correa's material support enabled its publication. If so, the case is quite parallel to that of Pursh's "Flora Americae Septentrionalis," which also owed its initial impetus to Professor Barton, but was dedicated to A. B. Lambert whose later support brought it to actual publication. Pursh proved more gracious than Nuttall, for his preface acknowledged the assistance which he had received from his first patron.

We have already examined the nature of the "Genera." How was it received by contemporary American botanists? Elliott, perhaps the most discriminating of our early botanists, said of it in his Sketch: "A work abounding in accurate information respecting the plants of this country."[47] Schweinitz wrote of it to Torrey: "I think Mr. Nuttall's observations uncommonly excellent. His Genera have given me more light than any other book—it is so evident from all his remarks in that work, that they are the fruits of real personal acquaintance with the plants in nature."[48] And Torrey, in the preface to his "Flora of the Northern and Middle Sections of the United States," which he dedicated to Nuttall, remarked "that it has contributed, more than any other work, to the advance of the accurate knowledge of the plants of this country."

TRAVELS AFTER 1818. Nuttall's later journeys occurred at intervals from the last months of 1818 to near the end of 1836. Each resulted in special botanical reports and papers, but not in any comprehensive summary comparable to the "Genera." Also, in these later years his interest turned more to other fields of natural science, though only in ornithology did this result in extensive publication.

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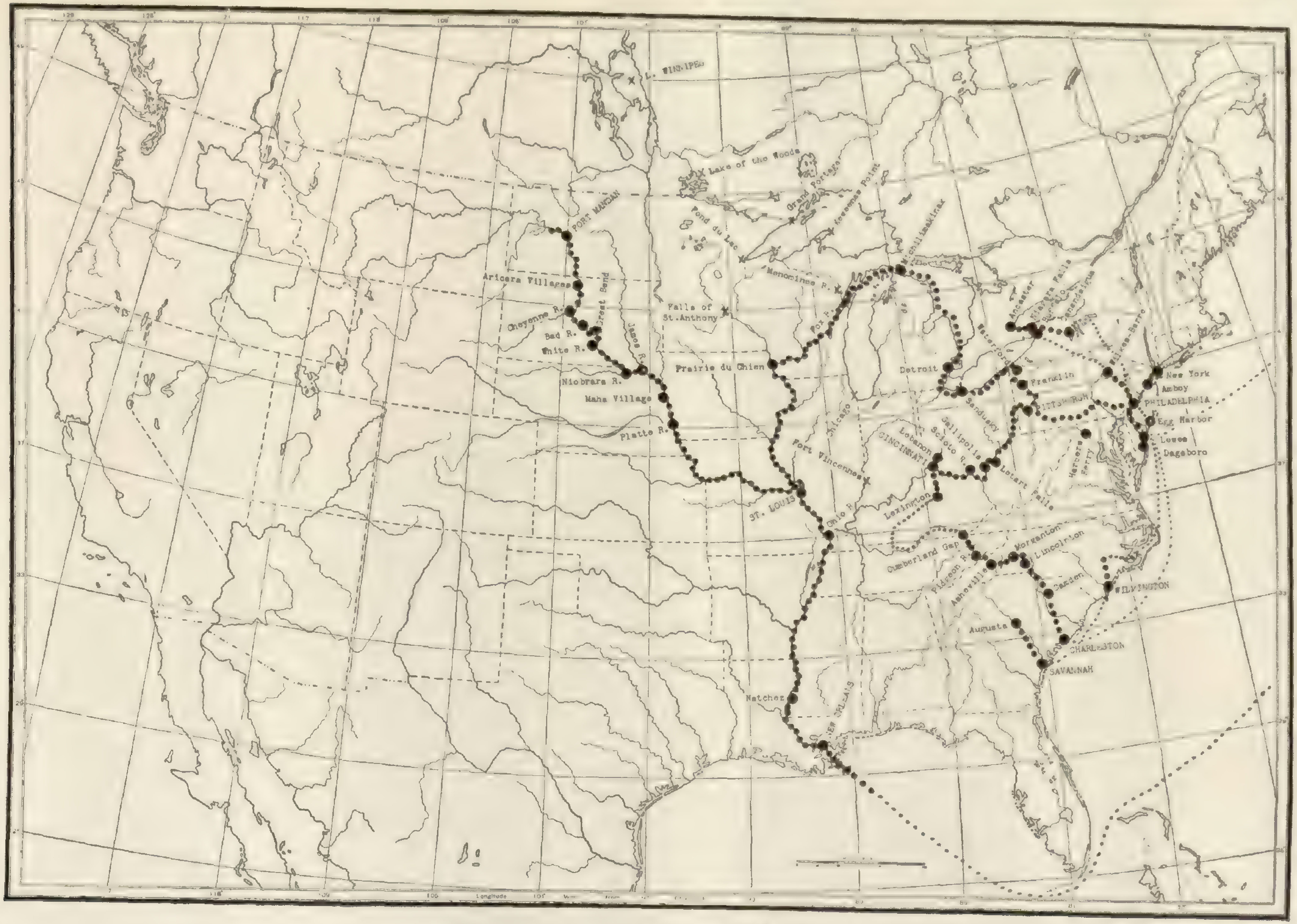
[47] 2: 62. 1824.

[48] Mem. Torrey Bot. Club 16: 142. 1921.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Lake of the Woods
Grand Portage
Keweenaw Point
Fond du Lac
FORT MANDAN
Aricara Villages
Great Bend
Cheyenne R.
Bad R.
White R.
James R.
Niobrara R.
Maha Village
Platte R.
Falls of St.Anthony
Prairie du Chien
Menominee R.
Fox R.
Michilimakinac
Chicago
Fort Vincennes
ST. LOUIS
Ohio R.
Detroit
Sandusky
Waterford
Ancaster
Niagara Falls
Buffalo
Canandaigua
Wilkes-Barre
Franklin
PITTSBURGH
New York
Amboy
PHILADELPHIA
Egg Harbor
Lewes
Dagsboro
Harpers Ferry
Letart Falls
Gallipolis
Scioto R.
Lebanon
CINCINNATI
Lexington
Cumberland Gap
Pigeon R.
Asheville
Morganton
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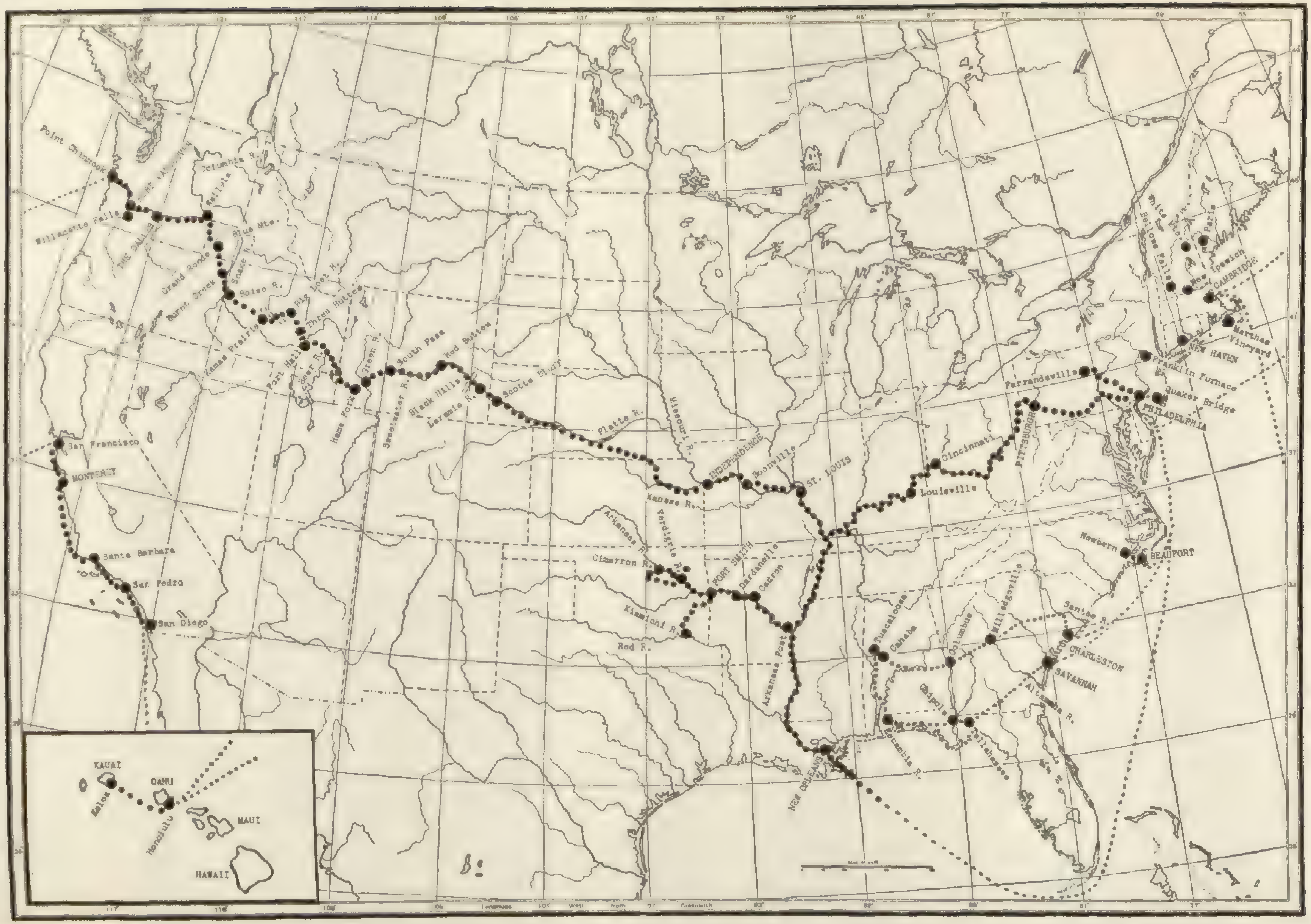
CHARLESTON
SAVANNAH
Natchez
NEW ORLEANS

Nuttall's Early Travels (1809-1817)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Kamas Prairie
Big Lost R.
Three Buttes
Port Hall
Bear R.
Hams Fork
Green R.
Sweetwater R.
South Pass
Black Hills
Red Buttes
Laramie R.
Scotts Bluff
Platte R.
Missouri R.
Kansas R.
INDEPENDENCE
Boonville
ST. LOUIS
Arkansas R.
Verdigris R.
Cimarron R.
FORT SMITH
Dardanelle
Cadron
Kiamichi R.
Red R.
Arkansas Post
NEW ORLEANS
Louisville
Cincinnati
PITTSBURGH
Farrandsville
Franklin Furnace
Quaker Bridge
PHILADELPHIA
NEW HAVEN
Marthas Vineyard
CAMBRIDGE
New Ipswich
Bellows Falls
White Mts.
Paris
Newbern
BEAUPORT
Santee R.
CHARLESTON
SAVANNAH
Altamaha R.
Milledgeville
Columbus
Tuscaloosa
Cahaba
Chipola
Tallahassee
Escambia R.
San Francisco
MONTEREY
Santa Barbara
San Pedro
San Diego
KAUAI
Koloa
OAHU
Honolulu
MAUI
HAWAII
Longitude West from Greenwich

Nuttall's Later Travels (1818-1836)

Arkansas Journey (1818-1820). Scarcely was the printing of the "Genera" completed, before Nuttall had started on another long journey.[49] On October 2, 1818 he left Philadelphia, apparently returning thither in the spring of 1820. In the intervening year, 1819, he ascended the Arkansas River through the present state of Arkansas to Fort Smith, crossed via the valleys of the Poteau and Kiamichi rivers to the latter's confluence with the Red River (through what is now southeastern Oklahoma), and thence, returning to the Arkansas River, traveled up it to the Cimarron River. Day by day, in "A Journal of Travels into the Arkansa Territory during the Year 1819,"[50] we can follow his precise route, and this is depicted on an accompanying map. He tells us of the Indian tribes and their customs[51]—indeed, the work is full of interest from other viewpoints than botany. He had his full share of dangers. This is the most documented of Nuttall's travels, and so the present account will be reduced to a mere itinerary.

October, 1818. Philadelphia to Pittsburgh. (Oct. 2—by stage to Lancaster; thence afoot: Oct. 3-4, to Harrisburgh; Oct. 5-8, via Carlisle, Shippensburgh, Cammels'-town, Loudon and McConnel's-town to Bedford; Oct. 9-10, to Stoystown; Oct. 11-15, via Liganier and Greensburgh to Pittsburgh; Oct. 16-20, at Pittsburgh.)

October-November, 1818. Down the Ohio River to Louisville, by skiff. (Oct. 21-25, to Steubenville [Ohio]; Oct. 25-26, to Wheeling [W. Va.]; Oct. 27-30, to Marietta [Ohio]; Oct. 31, to 4 mi. above Shade River; Nov. 1-4, to below Gallipolis ("Galiopolis"); Nov. 5-9, to below Portsmouth; Nov. 10-13, to Cincinnati; Nov. 14-16, at Cincinnati; Nov. 17, to Lawrenceburg [Ind.]; Nov. 18-20, to Madison; Nov. 21-23, to Louisville [Ky.]; at Louisville, till December 6.)

December, 1818. Down the Ohio River to its mouth, by flat-boat. (Dec. 7-10, to Owensville [now Owensboro, Ky.]; Dec. 11-12, to Evansville [Ind.]; Dec. 13-14, to Shawneetown [Ill.]; Dec. 15-17, to mouth of the Ohio; Dec. 18, at the mouth.)

December, 1818-January, 1819. Down the Mississippi River to White River, by flat-boat. (Dec. 19-22, to New Madrid [Mo.]; Dec. 23-Jan. 7, to St. Francis R.; Jan. 8-12, to mouth of White R.; Jan. 13, at mouth.)

January, 1819. To Arkansas River, by flat-boat. (Jan. 14-15, up White R. and through bayou to Arkansas R.)

January-April, 1819. Up Arkansas River to Fort Smith, by boat. (Jan. 16-25, by flat-boat to Arkansas Post (with advance visit afoot); Jan. 26-Feb. 25, at

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[49] Nuttall dedicated his "Journal of Travels into the Arkansa Territory" to Joseph Correa de Serra, Zaccheus Collins, William Maclure, and John Vaughan, speaking of his trip as "the gratifying task which your liberality had imposed," thus indicating the financial backers of his journey. It is interesting to note that his patrons included the president and vice-president of the Academy of Natural Sciences. Meehan's informant gives Reuben Haines as also at some time a financial helper of Nuttall's trips. Evidently Nuttall had the faculty of making friends.

[50] Philadelphia: printed and published by Thos. H. Palmer. 1821. Reprinted as Volume 13 of "Early Western Travels," edited by R. G. Thwaites.

[51] Meehan's informant tells of Nuttall's "generous feelings" towards the Indians, to whom he was known as "the pale-face medicine man," adding: "Knowing their proclivities for whiskey, Mr. N. used to supply himself with this novel *pacificator* for cases of emergency, but never employed it when another agent would answer as well."

Arkansas Post; by skiff to Dardanelle: Feb. 26-Mar. 12, to Pine Bluff; Mar. 13-20, to Little Rock; Mar. 20-23, to Mamelle Mt.; Mar. 24-27, to Cadron Creek; Mar. 28-30, at Cadron; Mar. 31-Apr. 7, to Dardanelle; Apr. 8-19, at Dardanelle; Apr. 20-24, to Fort Smith, by perogue; Apr. 25-May 15, at Fort Smith ("Belle Point").)

May-June, 1819. Excursion to Red River, by horse. (May 16, across Cedar Prairie; May 17-18, up valley of Poteau ("Pottoe") R. [Okla.]; May 18-22, down valley of Kiamichi ("Kiamesha") R. to confluence with Red R.; May 23-24, up along Red R. 15 mi. to Horse Prairie; May 25, at Horse Prairie; May 26, down along Red R. to mouth of Kiamichi; May 27-June 13, about mouth of Kiamichi R.; June 14-19, up valley of Kiamichi R.; June 20-21, down valley of Poteau R. to Fort Smith; June 22-July 5, at Fort Smith [Ark.])

July, 1819. Up Arkansas River to Verdigris River, by boat. (July 6-11, to Canadian R. [Okla.]; July 12-14, to mouth of Verdigris R.; July 16, at mouth.)

July, 1819. Excursion to Osage salt works. (July 17-18, up Grand R. to Saline [Creek], by canoe; July 19, at Saline; July 20, afoot across prairie to mouth of Verdigris R.; July 21-Aug. 10, at mouth of Verdigris R.)

August-September, 1819. Excursion to Cimarron ("Great Salt") River, by horse. (Aug. 11-13, to Deep Fork ("Little North Fork") of Canadian R.; Aug. 14-21, near Deep Fork; Aug. 22-Sept. 3, to Cimarron ("Salt") R.; Sept. 4-9, down Cimarron to Arkansas R.; Sept. 9-14, down south shore of Arkansas R.; Sept. 14-15, to mouth of Verdigris R.; Sept. 16-22 (?), at mouth of Verdigris R.)

September, 1819-January, 1820. Descent of Arkansas River, by boat. (Sept. 22(?)-27(?), to Fort Smith [Ark.]; Sept. 27(?)-Oct. 15, at Fort Smith; Oct. 16-Nov. 3, to the Pecannerie settlement, about 10 mi. above Cadron Creek [Conway Co.]; Nov. 4-Dec. 17, at Pecannerie;[52] Dec. 18, to Cadron; Dec. 19-Jan. 3, at Cadron; Jan. 4-15, to Arkansas Post; Jan. 16-18, at Arkansas Post; Jan. 19-20, to confluence with Mississippi R.)

January-February, 1820. Descent of Mississippi River, by flat-boat. (Jan. 21-31, to Natchez [Miss.]; Feb. 1-3, at Natchez; Feb. 4-7, to Bayou Sara ("bayou Sarah") [La.]; Feb. 8-13, to New Orleans.)

The "Journal" ends with the arrival at New Orleans, but it is evident that Nuttall returned directly to Philadelphia (or a neighboring seaport) by boat. No later work gives any suggestion of an intermediate stop, and the knowledge of the Florida Keys evident in the "Sylva" of 1842 was derived wholly from Dr. Blodgett's collections. Nuttall would have reached our city about April, and the first allusion to him in the minutes of the Academy's meetings for 1820 is of May 2.

Philadelphia (1820-1823). As early as May 16, 1820 Nuttall presented before the Academy of Natural Sciences "an account of the geology of the Mississippi valley," although as actually published in 1821 his "Observations of the Geological Structure of the Valley of the Mississippi" was said to have been read in December, 1820. It shows an effort to correlate his widely scattered observations, so as to build a consistent picture. In 1821 he gave time to mineralogy, making chemical analyses, on April 3 reporting to the Academy concerning two supposedly new minerals, and on May 8 reading a considerable paper on the "Serpentine Rocks of Hoboken, New Jersey." But his main occupation must have been with his Arkansas notes and collections. By the end of 1821 his "Journal of Travels into the Arkansa Territory" had been published, with its appendices concerning the Indian tribes—a feature that would have delighted Professor Barton.[53] But his extensive botanical report progressed slowly, though he presented descriptions from it before the Academy in August and September, 1821, and in March, 1822, which were published in its Journal (2: 114-123, and 179-182).

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[52] At this point (p. 215) is inserted a brief account of the "hot springs of the Washita." It is evident that Nuttall did not undertake to visit these, as is stated by Durand.

During 1820 and 1821 the minutes of the Academy's meetings have many references to Nuttall, and, as the custom of stating who was present at each commenced with February 26, 1822, we have thenceforth a record of his presence at these weekly gatherings. But after April 9 of that year, we have no record of his attendance for a long period. Partly, this was due to absence from the city, and a letter to John Torrey, written July 2 from New Haven, shows him giving a course of botanical lectures in that city. Yet, on December 15, he was again in Philadelphia,[54] as that is the address given on a letter to Professor Silliman of Yale University. His inattendance at the Academy's meetings then was likely due to slackened interest, for in after years we shall find this a somewhat uncertain means of testing Nuttall's absences from Philadelphia.

Again in 1823 Nuttall went to New England, arriving in the spring as is evident from records in papers presented to the Philadelphia Academy that year and published in its Journal. In his "Observations of the genus Oryzopsis,"[55] he included his new *O. *parviflora* as gathered near "Bellows Falls [southern Vermont], on the Connecticut" in May, while in a revision of *Corallorhiza*[56] *C. *verna* was described from the vicinity of New Ipswich [southern New Hampshire] "about the middle of May (1823)." Although these papers were "read" at the Academy meetings of July 1 and August 5, respectively, Nuttall himself was not included among the attenders on those dates, nor indeed throughout the year. As in later years we shall find him at Cambridge, Massachusetts, it seems probable that he had gone thither. Probably he returned to Philadelphia in the autumn, although there is again no record of his attendance at the meetings of the Academy of Natural Sciences. But on the return of Long's Second Expedition, which had been exploring what was later known as the Minnesota country and on which Thomas Say had been naturalist, Nuttall commenced studying its botanical collections. As the expedition arrived in Philadelphia on October 26, 1823 this implies his presence at the Academy subsequent to that date.

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[53] Meehan's informant says that this work "unfortunately was a poor speculation to his printer, through the absence of all anecdote and lightness, which, contrary to the strong advice of his friends, he would not admit."

[54] Amer. Journ. Sci. 6: 171. 1823. In the letter to Torrey, received "July 3rd, 1822" and now preserved at the Pennsylvania Historical Society, Nuttall says: "I have commenced lecturing to a class of about 35 chiefly students in the college and hope to inspire as much taste for the science as to assist perhaps ultimately the author* of the Boreal Flora of the U. S. to some new species," and as footnote: * "our Doctor Torrey, Esqr." Marion L. Phillips, Alumni Registrar of Yale University, informs me that Nuttall was not officially connected with that institution; while Anne S. Pratt, Reference Librarian, sends quotations from the Connecticut Herald for July 2, 1822. These comprise: "A Card. Mr. Nuttall respectfully informs the ladies and gentlemen of New Haven, that if it is their pleasure to form a small class for a private course of lectures on botany, he will have much pleasure in giving one during his stay here, at any time and place agreeable to them," and the Herald's recommendation of "Mr. Nuttall's lectures to the 'fellow citizens of New Haven.'"

[55] 3: 125-128.

[56] 3: 135-139.

England (1824). But, when accounts of only five species had been prepared, Nuttall's work on Say's collections was interrupted by a trip to England, and presumably to his family's home.[57] He seems to have crossed the ocean in winter or early spring, as this would both account for the little progress made on Say's plants and for his arrival in time to have communicated seeds of *Penstemon digitalis* to Robert Barclay at Bury-Hill, England in March.[58] A number of plants grown from various seeds so given were illustrated in the Botanical Magazine, commencing with September, 1824. Likely he did not return to this country until near or after the end of the year, and perhaps then he came to Boston rather than to Philadelphia.

Cambridge (1825-1829). From 1825 Nuttall was under definite appointment at Harvard University. He was not made formal Professor, as had been his predecessor, William D. Peck, who had died in 1822; but, instead, he was appointed Lecturer on Natural History, and also Curator of the Botanic Garden.[59] This was the only formal post he ever held, and the accompanying salary was certainly his largest remuneration from science. Durand speaks of him as " having but light duties of instruction assigned to him." However that be, it was evidently this experience that led him to prepare his " Introduction to

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[57] Schweinitz, who succeeded to their study, commences his " Catalogue of plants collected in the North Western territory by Mr. Thomas Say, in the year, 1823," with these words: " Mr. Thomas Nuttall, who had taken upon himself the charge of examining this collection, and had begun to commit his remarks to paper, not having returned from Europe in time to complete his work, the plants collected by Mr. Say were entrusted to me. . . ." Dr. Barnhart, who has called my attention to this passage, says that the two-volume report by W. H. Keating, in which this is embodied (2: 379), was published late in 1824.

[58] Bot. Mag. 52: tab. 2587. Aug. 1, 1825.

[59] Mr. George H. Chase, Acting Secretary to the Corporation of Harvard University, informs me that Nuttall held these two positions from 1825 to 1834. Durand says of this appointment: " At the end of 1822, Mr. Nuttall was called to Cambridge, to fill, in the Harvard University, the place of the late Mr. Peck. He was not elected Professor of Natural History, but simply appointed Curator of the Botanic Garden, the fund of the Massachusetts Professorship of Natural History being insufficient for the support of a professor." Dr. Barnhart tells me that after Professor Peck's death in October, 1822 the Massachusetts Professorship was never filled, being superseded in 1842 by the Fisher Professorship to which Asa Gray was then appointed. While we have no evidence as to Nuttall's actually being in Cambridge in 1823, we may with some warrant suppose that he gave his botanical lectures there just as he had done the preceding summer at New Haven, and that he did so in hope of being appointed to the vacant Professorship. If in 1823 he had been given a promise for 1825, his course during the interval becomes clear.

Systematic and Physiological Botany," published in 1827. Before 1829 there is little evidence of his making more than local collecting trips, although we know that at some time before his " Sylva," and most probably during these years of his Harvard experience, he had been on Martha's Vineyard where he observed *Quercus stellata,* along the Androscoggin River, near Paris, Maine, where he saw *Pinus strobus,* and had climbed the White Mountains, on the summit of which he got *Betula* **rhombifolia.*

At Harvard Nuttall seems to have lived, apart from his professional contacts, almost a recluse's life. Durand speaks of this as a continuation of his Philadelphia behavior, and adds: " The house which he then occupied, and which is now the present habitation of the Professor of Botany, retains yet traces of some ingenious arrangements to favor his recluse habits." [60] Yet, he must have preserved his ability for making friends, for we shall later find Wyeth and Townsend attached to him.

That Nuttall paid another visit to his native country, at least over the winter of 1827-28, is evident from a letter of Torrey to Schweinitz, dated April 3, 1828: " Mr. Nuttall thinks that we may procure a collector . . . in England or Scotland & promised to bring out with him, in the Spring, such a person. . . .[61]

Durand, who would have heard of the matter by word of mouth, says that " Mr. Nuttall, aware that he was doing little for science, did not much relish his residence at Cambridge; he used to say that he was only vegetating, like his own plants." Meehan's informant gives the same information. There would seem to have been more than lack of time to prevent Nuttall from making the desired progress with his Arkansas collections. In those early days there was both lack of sufficient specimens for comparison, and of a sufficient library for reference. But Nuttall followed his ornithological interest with vigor, and apparently made two southern journeys primarily for the gathering of data in this field. From the suddenness with which the preparation of comprehensive work on birds was undertaken, one wonders if the opportunity may not have arisen through the support of some patron in Boston; but as the resulting volumes were copyrighted by Nuttall without dedication or suggestion of indebtedness, more likely they were financed out of the accumulated savings from his Harvard salary. These volumes, one on " Land Birds," the other on " Water Birds," he together called a " Manual of Ornithology," and it is mainly from their records that we can reconstruct the course of these two journeys. For the 1830 journey, this is well supplemented by records in Nuttall's " North American Sylva " and occasionally in other papers.

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[60] The late Professor B. L. Robinson, himself in the line of Nuttall's successors at Harvard, has told of these devices: " While living at the house in the Garden he kept himself much secluded in apartments reserved for him. He had a separate entrance by which he could enter and leave his study, and in the lower part of the Garden a particular small, locked gate, of which he alone had a key. Tradition states that he kept his valuable scientific collections over his study in a close, ill-smelling garret, which also served him as a bedroom. To avoid, so far as possible, any intercourse with other inmates of the house, he had a sort of slide cut, through which his meals could be passed." From " The Removal of an old Landmark," in Harvard Graduate Magazine, pages 418-421, 1911. The house, built in 1810 for Professor Peck, and, subsequent to Nuttall, the home of Dr. and Mrs. Asa Gray, was moved in 1910 to the other side of Garden Street.

[61] Mem. Torrey Bot. Club 16: 241. 1921.

Carolina Trip (1829). This short expedition, the most hypothetical of all those that I am proposing, rests upon the following evidence. We know that Nuttall early in this year came as far from Cambridge as Philadelphia, for he was present at meetings of the Academy of Natural Sciences on February 17 and 24, and again on March 17. Between the two latter dates I think that he had been by boat to Beaufort on the North Carolina coast. This would explain two records in the " Water Birds," which can not be fitted into any other journey. On page 446 he tells of having seen certain birds on the Neuse River at Newbern in February, and on page 292 others at Beaufort on March 4.[62] The dates in 1829 are the first records of Nuttall's appearance at the Philadelphia Academy since 1822, and his motive in coming is evident if he was actually en route to North Carolina.

Southern Journey (1830). The next southern expedition was longer, and it also involved a preliminary visit to Philadelphia. Nuttall was again at the Philadelphia Academy in December, 1829, being present at meetings on the 8th, 15th, and 22nd. But by January 12, 1830 he was at Charleston, South Carolina. From here started his " pedestrian tour of twelve hundred miles through the states of South Carolina, Georgia, Alabama and Florida." [63] He visited the Santee River, and was still in South Carolina on January 29.[64] Thence he crossed central Georgia via Milledgeville, where he saw *Magnolia grandiflora,* to " Columbus, on the Chatahoochee," the locality given for *Stillingia ligustrina. Magnolia grandiflora* was seen again on " Utchee Creek, about 12 miles from Columbus in Georgia; " Uchee Creek appears on present maps in Russell County, Alabama. In Alabama he found much *M. macrophylla,* and says that " to the town of Cahaba (in Bibb County), I still saw the *Magnolia,* and afterwards, in the immediate vicinity of Tuscaloosa, on the road down the banks of the Black Warrior, towards Florida." He was in Bibb County in the " winter of 1830," at Tuscaloosa on February 13 and 20, and still on the " prairies of Alabama " on February 26.[65] Thence he passed into extreme western Florida, for he saw *Myrica inodora* on the Escambia River in March, 1830. During this month he tramped eastward through " West Florida," at Chipola just west of the Apalachicola River getting *Gratiola *floridana,*[66] and at Tallahassee *Castanea*

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[62] The year is stated as " 1830," but that is obviously erroneous, as on March 4 of that year Nuttall was in western Florida.

[63] Trans. Amer. Philos. Soc. N. S. 4: 49. 1834.

[64] South Carolina records in " Land Birds " (ed. II), pages 347, 518, and 759.

[65] " Land Birds " (ed. II), pages 92, 365, and 487.

[66] Journ. Acad. Nat. Sci. Phila. 7: 103. 1834.

alnifolia and *Berlandiera *tomentosa;*[67] thence passing into lower Georgia he was on the Altamaha River[68] by the middle of March, and soon after was at Savannah.[69] He had made remarkable speed from the Escambia.

From Savannah Nuttall seems to have taken the boat directly to Philadelphia. We know definitely the date of his return hither, as "on the 17th of April, returning from a Southern tour of great extent," he observed certain birds at "Chester on the Delaware."[70]

Without attending a meeting of the Academy, Nuttall seems to have gone at once on an excursion into the mountains of Pennsylvania, for in "May, 1830" he was at "Farranville, on Susquehannah."[71] evidently Farrandsville on the West Branch of the Susquehanna River in Clinton County. This must be the trip of which Durand says that with Dr. Pickering he "proceeded to Pottsville; hence over the mountains to the Susquehanna, and up its west branch as far as the crossing of the Alleghany ridge."[72] This must have been in late April and early May, for he was back at Cambridge by about the 20th of the month, as he reports observations of birds on Fresh Pond, May 22, 1830.[73]

Cambridge (1830-1833). Once more at Harvard University, Nuttall settled down to intense work, preparing his "Manual of Ornithology," which was issued in two volumes: "Land Birds," in 1832; "Water Birds," in 1833. This is the largest and most discursive of Nuttall's works, and, although it differs from his botanical productions in attempting few taxonomic discussions, it contains a vast amount of information about habits, etc. It was published in Boston.

That Nuttall was honored at Cambridge and also that he did not feel at home there is evident from an incident that occurred in 1830. The Boston Society of Natural History was organized on April 28, while Nuttall was absent in Pennsylvania; he was elected its first president, but declined the office because "he regarded himself as only a transient resident in Boston."

Nuttall appears to have remained at Harvard until the end of 1833. By that time he had quite finished his long task with the "Manual," and had also made his momentous decision to accompany Captain Nathaniel J. Wyeth on his second transcontinental expedition in 1834. Durand, fully supported by Meehan's informant, says that, "not succeeding in obtaining a prolonged leave of absence from the college authorities at Cambridge to perform this long journey, he concluded to resign his office of Curator of the Botanical Garden." The Harvard records show that it was not until March 24, 1834 that " The President communicated a letter from Prof. Nuttall resigning his office, and thereupon it was voted that Prof. Nuttall's resignation be accepted." Nuttall's resignation would appear to have been made about the end of 1833, and so after Wyeth's arrival in Cambridge early in November.[74] Its date is in accord with Durand's statement of motive.

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[67] Trans. Amer. Philos. Soc. 7: 343. 1841.

[68] "Land Birds" (ed. II), page 418.

[69] He must have reached this sea-port so soon, as on page 246 of the "Land Birds" he speaks of this journey as "a tour through the lower parts of Georgia and West Florida, protracted to the middle of March."

[70] "Land Birds" (ed. II), page 485.

[71] "Land Birds" (ed. II), page 433.

[72] Durand's introductory sentence, while possible, seems unlikely in view of Nuttall's recent return from the South: "During the first six or seven years of his residence in Cambridge, Mr. Nuttall paid a visit to Philadelphia in company with several gentlemen of Boston, on their way to the coal and iron districts of Pennsylvania. Joined by Dr. Pickering, they proceed to Pottsville. . . ." Perhaps two visits have been confused.

[73] "Land Birds" (ed. II), page 433.

Philadelphia (1834). Nuttall's return to Philadelphia appears to have been about the middle of January, and he was present at all but one of the Academy's meetings from January 28 to March 11. In six or eight weeks he accomplished an amazing amount of botanical work.

First, there was the study of the small collection of plants that Capt. Wyeth had gathered on his adventurous eastbound course in 1833 " from the Falls of the Columbia to the first navigable waters of the Missouri." [75] These could not have reached Nuttall before early November, 1833, but his study was sufficiently finished to be read before the Academy February 18, 1834. Second, there was the long pending report on the Arkansas plants of 1819; probably, as shown by new species based on collections of that journey but which did not appear until Nuttall's later papers, this was not actually completed, but rather what was ready was drawn together for publication before setting out on the long journey now in prospect. Third, there was a paper, for which descriptions may well have been accumulating from the visits early and late in 1829, on the new and interesting specimens in the Academy's collections.[76]

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[74] Durand gives the time of Nuttall's return from Cambridge to Philadelphia as " Towards the beginning of 1833," but both the Harvard record giving Nuttall's term of service as lasting until 1834 and the fact that he did not appear at a meeting of the Philadelphia Academy until January 28, 1834 show that his transfer was a year later.

[75] Durand says that Nuttall brought with him to Philadelphia " a collection of plants gathered by Capt. Wyeth, during a journey overland to the Pacific." Such a collection was made during Wyeth's westbound course in 1832; it was consigned for delivery to Nuttall to Wyeth's brother (as shown by N. J. Wyeth's letter to Nuttall of July 4, 1833 in " The Correspondence and Journals of Captain Nathaniel J. Wyeth, 1831-6," published in 1899 as Volume I of the Sources of the History of Oregon); but it was apparently not delivered, since Nuttall's report was definitely confined to the plants of the returning eastbound course. The letter of July 4, 1833, written from the " Heads of Lewis [now Snake] River," gave Wyeth's plans as he could then foresee them and likely also it contained what was his first invitation to Nuttall: " I shall remain here one more year. You if in Camb[ridge] may expect to see me in about one year from the time you receive this. I shall then ask if you will follow another expedition to this country in pursuit of your science. The cost would be less than living at home." This makes it clear that Nuttall's decision for 1834 could not have been made before the closing months of the year, as Wyeth had not formed his own plans early enough to have communicated them. He traveled eastward to the Big Horn River, then down that and the Missouri. As shown by the dates on his letters, he was at St. Louis on October 9, Cincinnati on Oct. 17, Baltimore on Oct. 21-28, and reached his home in Cambridge by November 9, 1833. One other significant fact revealed by Wyeth's letter is that, when not drawing a salary, it was cheaper for Nuttall to travel than to live at home.

[76] The scope of these collections shows what material was coming to the Academy at that time. There were plants from Massachusetts collected by Dr. Pickering of the Academy,

These three papers were all left for others to see through press. The first, entitled "A Catalogue of a Collection of Plants made chiefly in the Valleys of the Rocky Mountains or Northern Andes, towards the sources of the Columbia River, by Nathaniel B. Wyeth,[77] and described by Thomas Nuttall," appeared in the Academy's Journal 7: 1-60. The third, entitled "A Description of some of the rarer or little known Plants indigenous to the United Plants, from dried specimens in the Herbarium of the Academy of Natural Sciences of Philadelphia," followed it on pages 61 to 115. The second, entitled "Collections towards a Flora of the Territory of Arkansas," was "read April 4, 1834" at a meeting of the American Philosophical Society, and was issued in its Transactions. On the day of the reading Nuttall was already in Missouri.

Transcontinental Expedition (1834-1836). For a detailed account of the Second Wyeth Expedition we are indebted to the ornithologist, John K. Townsend (of the Academy of Natural Sciences),[78] who accompanied it, as he informs us, at the suggestion of Nuttall. It is their travel together that is chiefly told in the "Narrative of a Journey across the Rocky Mountains, to the Columbia River, and a Visit to the Sandwich Islands, . . ."[79] There are many intimate and delightful glimpses of Nuttall, who brought to the journey all his old enthusiasm.[80]

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from North Carolina by Dr. H. Loomis and Mr. Croom, from Georgia by Dr. Boykin and T. J. Wray, from Florida by N. A. Ware and T. R. Peale, from Alabama by Dr. Gates, from Kentucky by Dr. Short, from Missouri by L. C. Beck, from Arkansas by Dr. Pitcher, and from the Rocky Mountains by Dr. James on Long's Expedition. Those of Nathaniel A. Ware had been presented in 1827-28, and most of the others had likely arrived since Nuttall had gone to New England at the end of 1822.

[77] Perhaps Nuttall was not the author of this title, and so may be acquitted of the wrong middle initial in Wyeth's name, although Dr. Barnhart says that he "had a remarkable facility for misspelling names." The offending "B" appears to have slipped into the title by accidental transferance from the name of John B. Wyeth, whose book about the first Wyeth expedition was just then attracting much attention.

[78] John K. Townsend was a young man, who had only been elected to the Academy the preceding September. On the title-page of his "Narrative" his name as author is followed by the statement of his membership, and indeed he was to remain for many years one of the Academy's most active members. To his transcontinental journey the Academy and the American Philosophical Society each contributed $100.00, as is shown by the Academy's receipt, dated March 12, 1834, preserved in the minute-book of its meetings. He was also in later years connected with the Smithsonian Institution at Washington, D. C.

[79] Philadelphia, 1829. Reprinted as Volume 21 of "Early Western Travels," edited by R. G. Thwaites.

[80] Some of these have been retold by Dr. W. L. Jepson in "The Overland Journey of Thomas Nuttall," in Madroño 2: 143-147. 1934. Thus, one relishes this from Townsend's record for the 28th of May, when along the North Platte River in what is now western Nebraska: "The road was very uneven and difficult, winding from amongst innumerable mounds six to eight feet in height, the space between them frequently so narrow as scarcely to admit our horses, and some of the men rode for upwards of a mile kneeling upon their saddles. These mounds were of hard yellow clay, without a particle of rock of any kind, and along their bases, and in the narrow passages, flowers of every hue were growing. It was a most enchanting sight; even the men noticed it, and more than one of our matter-of-fact people exclaimed, *beautiful, beautiful!* Mr. N. was here in his glory. He rode on ahead of the company, and cleared the passage with a trembling and eager hand, looking anxiously back at the approaching party, as though he feared it would come ere he had finished, and tread his lovely prizes under foot."

With such a source our record of the westbound course may become an itinerary:

March, 1834. Philadelphia to St. Louis. (Leaving Philadelphia, on or soon after Mar. 12, to Pittsburgh, presumably by stage; to St. Louis, by steamboat, arriving Mar. 24; at St. Louis [Mo.], Mar. 25-28.)

March-April, 1834. St. Louis to Boonville, afoot. (Mar. 29-30, to St. Charles; Mar. 31-Apr. 5, to Fulton; Apr. 7, via Columbia to Rocheport; Apr. 8, to Boonville.)

April, 1834. Boonville to Independence, by steamboat. (Apr. 9-14; and at Independence, Apr. 10-27.)

April-May, 1834. Independence to Platte River, by horse. (Apr. 28-May 2, to Kansas R. [Kans.]; May 3-5, to Little Vermillion Creek; May 6-18, to Platte R. [Neb.].)

May-June, 1834. Up valley of Platte River, by horse. (May 19-23, along Platte R. to forks; May 24-29, along North Platte to Scotts Bluff; May 30-June 1, to Laramie's Fork [Wyo.]; June 2-8, to west of Casper Range (" Red Butes "); June 9, over " desert " to Sweetwater R.; June 10-14, up Sweetwater R.; June 14, across South Pass to Sandy R. of the Colorado.)

June-July, 1834. Across valley of Green River, by horse. (June 15-19, down along Sandy R. to Green R.; June 20-July 2, at camp and down Green R.; July 3-4, up Ham's Fork to Bear River Divide.)

July, 1834. Down valley of Bear River, by horse. (July 4-5, down " Muddy Creek," near present course of Oregon Short Line; July 6-8, over mountains west of river so as to cut off bend and then down river valley to Soda Springs (" White-clay pits ") [Ida.]; July 9, at Soda Springs; July 10, north to head of Blackfoot River.)

July-August, 1834. In valley of Snake River, by horse. (July 11-12, to Ross Creek; July 13-14, to Snake R. (" Lewis " R.); July 15, across Portneuf R. to site of Fort Hall; July 16-Aug. 5, at Fort Hall (just founded); Aug. 6-8, to Big Lost R. (" Goddin's Creek "); Aug. 9-10, over mountains to " Goddin's Creek " again; Aug. 11-13, over mountains[81] to headwaters of the Wood (" Mallade ") R.; Aug. 14-19, down this river and over plain, crossing " Kamas Prairie," to Boise (" Boisee ") R.; Aug. 20-23, down valley of Boise R. to Snake R.; Aug. 24, to Malheur R. [Ore.]; Aug. 24-25, across low mountains to bend of Snake R. above Burnt River (" Brulee R.") up valley of Burnt R.; Aug. 28, to Powder River; Aug. 29-31, over mountains to the Grand Ronde valley; Sept. 1, up ridge of Blue Mts.)

September, 1834. Blue Mountains to The Dalles, by horse. (Sept. 1-2, to Umatilla (" Utalla ") R.; Sept. 2-3, to Walla-walla R. and Wallula (" Fort Walla-walla ") [Wash.]; Sept. 4, at Fort Walla-walla; Sept. 5-10, along south bank of Columbia R. to The Dalles [Ore.].)

September, 1834. Down Columbia River to Fort Vancouver, by canoe and afoot. (Sept. 11-13, by canoe; Sept. 14-16, afoot on northern (Washington) bank.)

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[81] Here was " Thornberg's Pass " and the " Pass of the Shoshonee," in the " central chain of the Rocky Mountains," where was gotten *Salix *rotundifolia* and **Cercocarpus *ledifolia*, as stated in Nuttall's " Sylva." The former place, to which the party climbed under guidance of a man named Thornberg, was not actually a pass; and of *Aster *andinus* (Trans. Amer. Philos. Soc. 7: 291. 1841) Nuttall says that it grew " near the summit of Thornberg's Ridge, where we made an ineffectual attempt to cross the Northern Andes."

September-December, 1834. Near the lower Columbia River. (Sept. 17-28, at Fort Vancouver [Wash.]; Sept. 29-Nov. 1, excursion on the Willamette ("Wahlamet") R. [Ore.]; Nov. 1-22?, at mouth of Willamette R., aboard brig; Nov. 23?-Dec. 2, at Fort Vancouver [Wash.]; Dec. 3-11, down Columbia R. to Cape Disappointment, on brig.)

December, 1834-January, 1835. On Pacific Ocean, by boat. (Dec. 12-Jan. 4.)

January-March, 1835. Hawaiian ("Sandwich") islands. (Jan. 5-Feb. 9, at Honolulu ("Honoruru"), on Oahu; Feb. 11-Mar. 15, at Koloa, on Kauai; Mar. 18-25, at Honolulu.)

March-April, 1835. On Pacific Ocean, by boat. (Mar. 26-Apr. 14.)

On the 15th of April, 1835 Townsend and Nuttall reached Cape Disappointment again, in preparation for a season of zoological and botanical collecting on the Columbia and its affluents. By the 17th their vessel had reached the brig's old mooring ground at the mouth of the Willamette River. During the year they traveled much, both together and on separate expeditions, but unfortunately only occasional entries of this season's experiences were published from Townsend's journal. These supply but a single reference to Nuttall. More can be gained by bringing together the dated observations scattered through the second edition of his "Land Birds," and into the outline so formed the undated ones from the "Sylva" and the papers in the Transactions of the American Philosophical Society for 1841 and 1843 all fit. But there are puzzling discrepancies.

The first ornithological date, April 16, is assigned to the mouth of the "Wahlamet river," on the day before their supposed arrival at that point. "Banks of the Columbia" and "of the Wahlamet" rivers seem likely enough for May, and probably the first month was busily spent in this neighborhood. Wappatoo Island, now called Sauvie Island [Ore.], is at the junction of the rivers. On May 29 and in June are bird observations from near the "outlet of the Wahlahmet." On June 21 is a record from Fort Vancouver [Wash.], but it is likely that this base was touched repeatedly in the season. On July 4 are two records from Point Chinhook [Wash.], far down on the estuary toward Cape Disappointment. All these would suggest that Nuttall had not yet traveled far from the lower course of the Columbia, and they leave one unprepared for Townsend's entry supposedly of July 11 concerning "Mr. Nuttall, who has just returned from the Dalles, where he has been spending some weeks." If the last record be actually for August 11 the situation would become clear,[82] except that toward the "end of July" is a record from "prairies of the Wahlahmet," suggesting that Nuttall had gone instead up the Willamette valley. Such is the meagre itinerary for a season's busy work.[83]

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[82] In answer to the question whether some of these dated records, all of which concern birds, could not have been supplied by Townsend, is the fact that on July 4 he was at Wappatoo Island and could not possibly have supplied the two records from Chinhook. Townsend's entry, just mentioned, is merely "11th" and occurs between that for "July 4th" and "August 19th," so that the above suggestion is quite plausible.

[83] Dated records cited from "Land Birds" (ed. II.), pages 248, 270, 396, 401, 492, and 715.

On October 1, 1835 Townsend tells of the departure of Nuttall for a second winter in the Hawaiian Islands. With him went Dr. Gairdner, the surgeon of Fort Vancouver and himself a botanical collector of some note. Nuttall passed a second winter on the Hawaiian Islands,[84] and thence crossed to the American coast in early spring.

In March, 1836, as we are informed in the introduction to the "Sylva," Nuttall reached Monterey on the coast of California, or "Upper California" as it was called in the Mexican days. As Monterey was then the seat of government, it was the first point to be considered, but I suspect that the vessel from the Hawaiian Islands had already touched at San Francisco as *Bahia artemisiaefolia* was obtained there. At Monterey he gathered in March *Alnus *rhombifolia, Wyethia *angustifolia,* etc. Soon the brig *Pilgrim* arrived, and Nuttall took passage in it southward along the coast.[85] Much of April must have been spent at Santa Barbara, for there he made his most extensive collections, getting *Heterotheca *grandiflora, Encelia *californica, *Psilocarphus *tenellus,* etc. In the "Land Birds" are records from Santa Barbara, credited to April 13[86] and to late April. At San Pedro, still in California, the stay must have been brief, for I note only *Grindelia *robusta* and *Hartmannia *glomerata.* But at San Diego, where the *Pilgrim* is said to have arrived on April 15, there is again a long list of species; of these **Ptilomeris *aristata* was credited to April, and *Leptosyne *californica* and **Tuckermannia *maritima* to May.

At San Diego was waiting the *Alert,* on which was serving a young sailor who wrote of his adventures at sea in the delightful book "Two Years before the Mast." R. H. Dana tells of Mr. Nuttall, who is but slightly disguised as "Professor N———, of Cambridge," whom "I had left . . . quietly seated in the chair of Botany and Ornithology, in Harvard University."[87] At Monterey, Nuttall is said to have taken passage in the *Pilgrim,* and then "came slowly down, visiting the intermediate ports, and examining the trees, plants, earths, birds, etc., and joined us at San Diego shortly before we sailed." All this accords well with Nuttall's records from the California ports, but not with Dana's previous statement (p. 332) that the Pilgrim arrived as early as April 15. Perhaps she went back again to Santa Barbara, or else some other coasting vessel brought Nuttall the latter part of the way.

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[84] That Nuttall remained there over the second winter is proved by his letter to Torrey December 6, 1836, now preserved at the New York Botanical Garden: "At present we are in the midst of an arctic winter here [at Philadelphia] which after two winters at the Sandwich Islands feels severe enough."

[85] The fullest locality records from Nuttall's stay in California are to be found in his botanical papers in Trans. Amer. Philos. Soc. N. S. 7: 283-453 and 8: 251-277.

[86] Nuttall seems to have had a habit of giving dates a year too early, as the two citations to this day are for 1835. Dated citations for Santa Barbara will be found on pages 174, 270, 492, and 554. These are all I have discovered for California.

[87] Page 359. 1840.

It is thanks to Dana that we have an account of the voyage home, and a sharply drawn picture of the only through passenger, " Old Curious " as the sailors called Nuttall because of his interest in all things strange and curious. The *Alert* left San Diego on May 8, crossed the equator on May 28, passed Staten Island (northeast of Cape Horn) on July 22, passed Fernando Noronha (off the eastern tip of Brazil) on August 18, and reached Boston on September 20, 1836.[88] During all the long voyage, there had not been a single opportunity to go ashore. Disappointed as Nuttall must have been on that account, he was safely reaching home with his accumulation of collections. Meehan's informant, fully supported by Durand, tells us that " the owners of the vessel that brought him home from the Pacific, Messrs. Sturgis and Bryant, of Boston, to their honor be it said, would not take a cent of passage money from him, ' as,' said they, ' you travel for the benefit of mankind.' "

Philadelphia (1836-1841). By late October Nuttall was back at the Academy of Natural Sciences, where he attended a meeting on the 25th. From then until the end of 1841, five years later, he was mostly present at its meetings, but with occasional lapses of considerable length. Some of these may represent sickness, some perhaps excursions the results of which are not evident in any of his writings, and some (as seemed to be the case in 1822) simply periods of non-attendance.[89] For the years 1838 to 1841 he headed the Academy's Botanical Committee.

Exactly a century ago Nuttall had just returned from his long journey, and was commencing to organize his varied collections. He had gathered mineralogical and zoological, as well as botanical specimens. As early as January and February, 1837, T. A. Conrad read before the Academy a report, entitled "Descriptions of new marine Shells, from Upper California. Collected by Thomas Nuttall, Esq." [90] On June 18, 1839, J. W. Randall similarly read a paper, entitled a "Catalogue of the Crustacea brought by Thomas Nuttall and J. K. Townsend from Upper California and the Sandwich Islands." Nuttall had obtained so much more information about birds that in 1840 he himself published a second edition of his "Land Birds," incorporating his far western observations directly in the text. There must have been collections of many other groups that did not have the fortune to be so studied.

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[88] Durand erroneously gives the arrival as " in the beginning of October, 1835."

[89] Lapses of attendance, involving a calendar month or longer, occurred as follows: July, 1837; June to August, 1838; October, 1838 to September, 1839; March to July, 1840; June, 1841; September, 1841. Over the periods of longest non-attendance Nuttall was continuously head of the Botanical Committee, and so evidently with his headquarters at the Academy. At the Historical Society of Pennsylvania is a letter that explains much, as it was written to Torrey on October 27, 1838, just at the beginning of the longest lapse of all. In it Nuttall says: " If I get the Umbelliferae [done] this winter it is as much as I can do, for I intend going 2 or 3 months to the South, the Carolinas & perhaps Georgia.—I am so miserably accomodated here in a room *without a fire*, that it is impossible for either me or anyone else to consult the Herbarium, till warm weather returns, and I can not take the bundles out of the building to any other place where I might accomodate myself. So that, in regard to this Institution, as it is managed *at present*, I am in the situation of buffeting with the ' Dog in the Manger '. . . . For any interest taken here in botany one might as well be amongst the Hottentots themselves. I am now very sorry, that they ever had a specimen of anything from me—but my hand is now effectually closed to them, nor shall my pen ever indite another line for their Journal. Of all the papers I furnished them I have *never been able* to obtain in any way (except by buying their Journal) a single copy for distribution. So much for the gratitude of public bodies! and (would be) scientific Societies." A later hand has copied over the year-date to " 1828," but the allusion to Umbelliferae (as well as the irregularity of the old figure beneath the " 2 "), shows that the year must have been 1838; this is confirmed by another letter to Torrey, preserved at the New York Botanical Garden, which under date of October 16, 1838 says that he is planning to finish Umbelliferae, " after which I shall probably go on to the South for 2 or 3 months." One suspects that a stove must have been installed by the next autumn, for from September, 1839 Nuttall was again a frequent attender at the Academy meetings. Also he proved liberal in giving the Academy his western collections, although one sees why his later papers nearly all appeared in the Transactions of the American Philosophical Society. I have found no evidence in these papers that the proposed southern journey was actually performed.

But Nuttall's first task must have been the study of the Polypetalous plants gathered on his transcontinental expedition and in California, as his descriptions of many new species of these were incorporated into Torrey and Gray's "Flora of North America," [91] of which the first part appeared in July, 1838, with subsequent installments in October, 1838 and June, 1840. On his own account he commenced the preparation of a series of studies, almost monographic in character, as reports upon the plants of the great journey. Two were issued in the Transactions of the American Philosophical Society: "Descriptions of New Species and Genera of Plants in the Natural Order Compositae, collected on a Tour across the Continent to the Pacific, a Residence in Oregon, and a Visit to the Sandwich Islands and Upper California, during the Years 1834 and 1835," read October 2 and December 18, 1840; [92] and "Descriptions and Notices of new or rare Plants, Lobeliaceae, Campanulaceae, Vacciniaceae, Ericaceae, collected in a Journey over the Continent of North America, and during a Visit to the Sandwich Islands and Upper California," read December 3, 1841.[93]

Elias Durand, who came to Philadelphia in 1824 and first made Nuttall's acquaintance just before his last journey, has given us a picture of his habits then and at this later time. He tells us of his assiduous work, so constant and so concentrated that he would forego the interruption of noonday meals. He was frugal in the extreme, and no one knew where he lived. He "was naturally shy and reserved in his manners in general society, but not so with those who knew him well." This personal view of Nuttall is the original feature of Durand's sketch of him, and for it he also drew on the memories of Professor Carson, Dr. Pickering, Mr. Lea, and other friends.[94]

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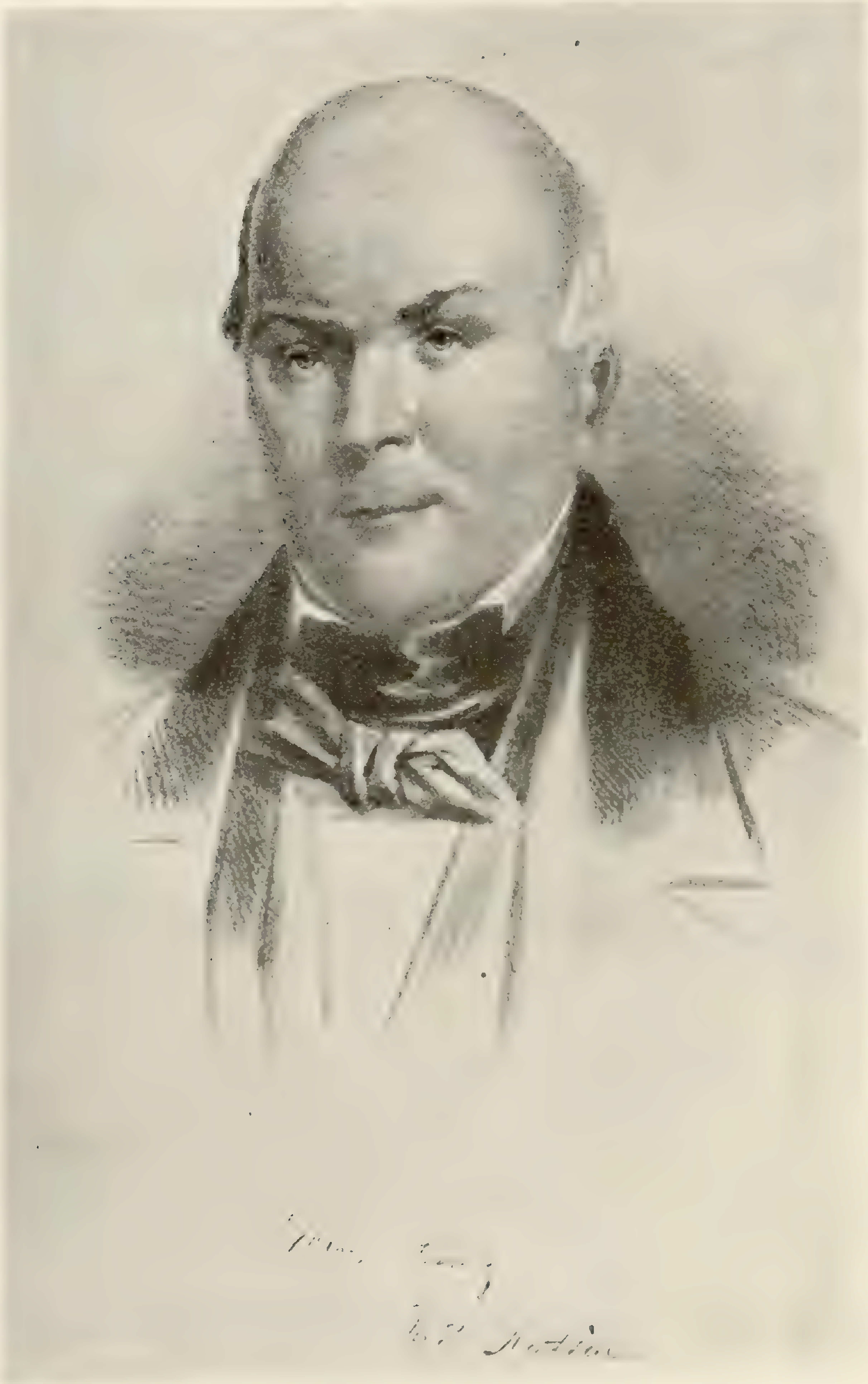
[90] Durand speaks of Nuttall's own study of conchology, but he seems to have published nothing on this subject, leaving his collections to be reported by Conrad and Isaac Lea.

[91] Mr. Eggleston's notes say that Torrey had originally invited Nuttall to join him in this work, but that the invitation had been declined.

[92] 7: 283-453. 1841. This contains also some records of Nuttall's plants from the eastern United States, such as *Pityopsis* **falcata* at Quaker Bridge, New Jersey.

[93] 8: 251-277. 1843.

[94] Meehan's informant says: "He hated everything that savored of vanity or useless show, always aiming at the real and substantial. . . . He carried his habit of simplicity always with him. His dress, though always neat, was chosen with a view to service; sometimes on



THOMAS NUTTALL ABOUT 1840

But these years of congenial work at the Academy were too soon to pass. The series of western monographs never passed beyond the three that have been mentioned. The project of extending Michaux's "Sylva" by the addition of three more volumes[95] was put through in haste, and the result left to others to see through the press. Like all of Nuttall's botanical studies, it was filled with original taxonomic work. Nuttall was called back to England, and the peroration to the introduction of the " North American Sylva " has pathos because he went unwillingly. He wrote: " But the oft told tale approaches to its close, and I must bid adieu to the New World, its sylvan scenes, its mountains, wilds, and plains,—and henceforth, in the evening of my career, I return, almost an exile, to the land of my nativity! "

But why was Thomas Nuttall returning to England? His brother Jonas had left him heir to Nut-Grove Hall, in southern Lancashire, but it was upon the condition that Thomas should reside there at least nine months of every year.[96] Distasteful as this clause must have been, the legacy did make provision for his old age. Nuttall took his large herbarium with him, but it seems to have remained ever after nearly in the condition that it left Philadelphia. We can tell this by comparison with the duplicates from it that were left behind in herbaria of this country.

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his journeys, made of leather, and fitted to his person; and probably in no event of his life did pecuniary considerations influence him. His income was mainly derived from lectures, given in Germantown and Philadelphia, and the private sale of his collections and specimens." And again: " He was in fact emphatically a listener. Though frequently an honored guest at the fashionable Wistar and other Parties of Savans in Philadelphia, he had never anything to say until ' brought out; ' but when once the ice of a first introduction was broken, he was very communicative and free with his observations and knowledge." His presence at the Wistar Parties is also mentioned by E. P. Oberholtzer in " The Literary History of Philadelphia," p. 200. 1906.

A less pleasing picture is given by Miss Melvina Lawson, the colorist of the plates for Nuttall's " Sylva," as reported in The Auk 34: 282. 1917.

[95] " North American Sylva," 3 volumes, Philadelphia, 1842-46. Beside the records already given, that of *Prunus americana* from Franklin Furnace, New Jersey, is from this work.

[96] The account given by F. R. Dixon-Nuttall (in Journ. Bot. 60: 57. 1922) differs however by saying that Thomas had to sleep there at least one week every six months. Durand had the relative be " an uncle, without family of his own," who left the estate to Thomas by a will which " was incumbered with a clause most distasteful to him, requiring him to reside at least nine months of the year in England for the remainder of his life. He hesitated, for a considerable time, whether to accept the inheritance, with its restrictions; but consideration for his sisters and their families, induced him at last to go to England, and take the rural estate left to him." Meehan's informant agrees as to the legacy being from an uncle and as to the terms of residence, but gives a different reason for Thomas' acceptance: " Relying on this bequest years before, he had sacrificed all his means to science; and having nothing laid by for the future he had to acquiesce." But F. R. Dixon-Nuttall says that " Jonas left Nut-grove Hall to my father with the life interest of Thomas Nuttall, and when he died we went to live there." As F. R. Dixon-Nuttall tells us that " Jonas and Thomas Nuttall were my father's uncles," I think that he would be correct as to the persons involved, but the season of Nuttall's subsequent visit to America makes me think that Meehan's informant and Durand were correct as to the special terms.

The only important series of Nuttall's specimens in America is at the Academy of Natural Sciences of Philadelphia.[97] Here was his American headquarters for the study of our flora. Before 1830 the contemporary " Handbook to the Museum of the Academy of Natural Sciences of Philadelphia " credited him with having given the institution over 4,000 species of plants from the Missouri and Arkansas Rivers, the Great Lakes, Carolina, Georgia, Louisiana, etc. Before 1837 he had followed this by the gift of his large exotic herbarium, which had presumably been built up by exchanges, and included collections from as far away as the Cape of Good Hope, New Holland, and the South Sea Islands. In 1837 were added an extensive series from his recent transcontinental expedition, and these concern us now.[98]

Comparing these specimens at Philadelphia with those retained by Nuttall in his own herbarium, one notes that they are merely single or a few plants from the more ample material that was retained. The data are slightly more abbreviated, but in this regard there is little distinction. Especially, one is impressed by the fact that the same names uniformly occur in both series. This would show that both reflect Nuttall's determinations as made before the end of 1841, and clearly indicate how extensively he had already studied his plants. For many western species and genera, based subsequently upon later collections or nearly simultaneously upon David Douglas' specimens, Nuttall had selected his own definite names. It is indeed tragic that the great work of describing these plants was interrupted. Why it was so can only be explained by understanding the conditions at Nut-Grove Hall.

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[97] Some collections passed to Dr. John Torrey of New York, especially of the far western collections reported in Torrey and Gray's " North American Flora," and these are now at the New York Botanical Garden; but they do not amount to a " nearly complete suite " of the plants of the transcontinental journey as announced in the preface to this " Flora." Also some of these and of the Arkansas plants are at Harvard University, acquired directly or from Durand (See Bartonia 17: 44. 1936). But that they are relatively few seems evident from the following calculation based upon my search for types of " The Scrophulariaceae of eastern temperate North America." Of the species founded upon Nuttall's own collections, 19 types and isotypes are at the Philadelphia Academy, 12 types and isotypes at the British Museum, and 1 isotype at the New York Botanical Garden, but no specimen of a type collection was found at Harvard. The proportion at the British Museum would be increased if the western species from the transcontinental expedition had been included, but these are largely represented by isotypes at Philadelphia, and it is significant that when Asa Gray described *Penstemon humilis* Nutt., *P. caespitosus* Nutt., *Castilleja angustifolia* (Nutt.), and *C. breviflora* (Nutt.), from collections of that journey, he had seen only the specimens at the Academy of Natural Sciences. Nuttall's collections other than botanical seem to have been all given to the Philadelphia Academy, though only those of minerals were mentioned in the Academy's Handbooks.

[98] These " Handbooks," of which successive editions were issued at irregular intervals, are an invaluable source of information for the early growth of the Academy's collections. The dates of these accessions are shown by their inclusions in the summaries for 1830 or 1837. The final entry, as given in the book for 1862, is as follows: " *Nuttall Collection.*—Mr. Nuttall, an ardent and distinguished botanist, who for many years pursued his researches in various parts of the United States, presented 3,000 specimens of North American plants; at a later period his entire exotic herbarium, embracing among others, 1,500 Cape plants, collected by Masson (" Marson "), a large number of New Holland plants, and many interesting species from New Zealand, and the islands of the Pacific, collected by Forster ("Foster"), Labillardier, and others. Subsequently, he presented a complete suite of specimens collected by him in his arduous journey across the Rocky Mountains, to the mouth of the Columbia River, different parts of California, and the Sandwich Islands."

Residence in England (1842-1859). About the end of 1841[99] Nuttall left America to make his home in England. Nut-Grove Hall is near Prescot, a village near St. Helens on the the road from Liverpool. This is some miles south of the Blackburn district where he had spent his boyhood. On his estate he lived as a country gentleman, and Durand gives us an interesting glimpse of him through Dr. Pickering's visit in 1854. By that time he was busy growing Rhododendrons, and had developed conservatories as well as outdoor gardens. Durand says that the estate was so encumbered that its master had to give his own time to manual labor, while Meehan's informant assigns it the modest financial valuation of about $5000.

In the last months of 1847 and the first of 1848 Nuttall again visited America, obtaining nearly six months by combining his leave for both years.[100] Again in Philadelphia, he settled to work at the Academy of Natural Sciences, where he attended the meetings from December 28, 1847 to February 29, 1848. Three years before, in the autumn of 1844, Dr. William Gambel had crossed overland by a southern route to California, being there in the spring, and now Nuttall produced his last western study, entitled "Descriptions of Plants collected by William Gambel, M.D., in the Rocky Mountains and Upper California."[101]

If Nuttall could return to productive study of American plants immediately upon his return to this country and this institution, why did his own rich collections remain unstudied in England? This is indeed a mystery. Unless the terms of the inheritance were very strict, there would seem no reason why he should not have taken his plants for long visits to London, just as he had done years ago with the Missouri River collection of 1811. If there were time enough for a visit to North America, surely much could have been accomplished nearer home. But whatever the reason may be, Nuttall's study of American plants abruptly ended with the return to England, except for his paper "On Simmondsia, a new Genus of Plants from California,[102] in 1844, and what he accomplished on his last visit to America.

But his interest in the study of Rhododendrons grew, and his last botanical papers, both published in 1853 when he was 67 years of age, described new Asiatic species of this genus.[103] Thomas J. Booth, who had obtained most of those described, was, as we are circumstantially told by Meehan's informant, Nuttall's nephew, whom he "had adopted and treated as his own [child]; and the scientific spirit of his uncle had fallen on him." So he too had felt the urge to scientific travel. Our informant then tells how Nuttall's gardener "became insane and had to be removed, and just about that time a case of plants arrived from Mr. Booth. In his anxiety to open the case [Nuttall] unfortunately overstrained himself, and from the time of his injury gradually sunk" and died on September 10, 1859. Durand tells the same story, but Sutton states that "prolonged chronic bronchitis" was the cause of death.

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[99] He attended the meeting of the Philadelphia Academy on December 28, 1841, so did not sail on Christmas Day as has been stated.

[100] Erroneously given in Meehan's account as 1852-53. That there was not a second visit at that time is evident from the lack of Nuttall's name as an attender at the meetings of the Academy in Philadelphia.

[101] Journ. Acad. Nat. Sci. Phila. N.S. 1: 149-189. Aug., 1848. Preliminary diagnoses in Proc. Acad. Nat. Sci. Phila. 4: 7-26, (early in) 1848.

[102] Hooker's London Journ. Bot. 3: 400-401.

[103] Description of a new Species of Rhododendron from Bootan, in India, (*R. Kendrickii*)," in Ann. & Mag. Nat. Hist. 12: 10-11; and "Descriptions and Observations on some Species of Rhododendron, collected in Assam and Bootan by Thomas J. Booth," in Hooker's Journ. Bot. 5: 353-377.

The passing of Thomas Nuttall seems to have been scarcely noticed in English journals of the time.[104] By 1895 a short account of him by C. W. Sutton found inclusion in the many-volumed "Dictionary of National Biography," but so late as 1914 he is not mentioned in J. Reynolds Green's "History of Botany in the United Kingdom from the earliest Times to the End of the 19th Century." On our side of the Atlantic he has claimed more attention, and by early January of 1860 both Meehan's informant and Durand had prepared their sketches of his life.[105] American botanists have been zealous to gather what could be known of one who was not only a pathfinder but also among the keenest students of our plants. As Asa Gray once said: "No botanist has visited so large a portion of the United States, or made such an amount of observations in the field and forest. Probably few naturalists have ever excelled him in aptitude for such observations, in quickness of eye, tact, in discrimination and tenacity of memory.[106]

Nuttall's own herbarium passed on his death to the British Museum in London, where it is now in excellent custody. It would appear that up to the publication of the "Genera of North American Plants" in 1818 he kept few or no specimens for himself, presenting a complete series of his plants to the

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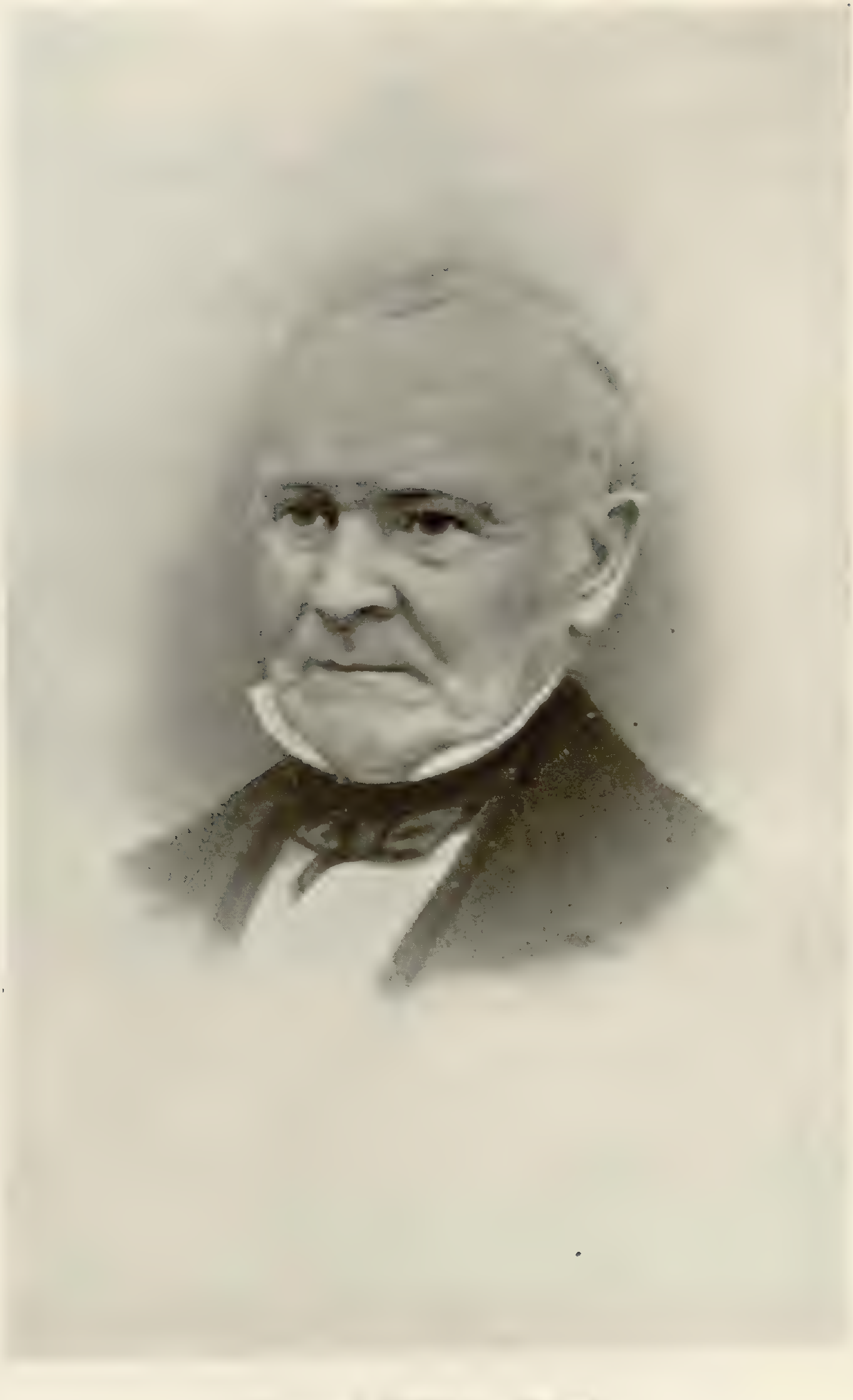
[104] A brief notice occurs in the Gentleman's Magazine 2: 653, Dec., 1859. . . . After summarizing his career, it concludes: "Dr. Nuttal returned to England, living at Nutgrove, an estate which was left to him on condition that he should reside on it."

[105] At least three portraits of Nuttall have been published, and these we are now reproducing. The earliest, presented as our frontispiece as it was also for volume 2 of Madroño, was "published by Henry Fisher, Caxton, London, Mar. 1, 1825," and so shows him as he appeared when visiting England in 1824. The second, showing him balder and with more rounded features, probably presents him as he was during his five years in Philadelphia from 1837 to 1841, inclusive; it was "drawn on stone expressly for the Gardener's Monthly," there accompanying Meehan's account, from which we learn that it was "pronounced by several of his old friends as a most faithful" portrait. The latest, surely dating from the last decade of Nuttall's life, seems to have been first issued as frontispiece to the Popular Science Monthly for March, 1895, from which it appeared again in W. J. Youman's "Pioneers of Science," p. 205, 1896, where we are told that it came "from a daguerrotype formerly belonging to Dr. Asa Gray." The first picture, as preserved at the Historical Society of Pennsylvania and as reported in Madroño by Professor W. L. Jepson, would seem to have been taken from some book or journal, but we have not discovered the actual source.

[106] North American Review, 59: 193, July, 1844. Gray's approval was given to Nuttall's earlier rather than later work, which he likened to that of Rafinesque. This comparison seems to me unjust, and I think that it betrays the fact that in 1844 Gray had not grasped what a remarkable proportion of endemism characterizes every portion of western North America. There is also the fact that Nuttall was inclined to the formation of small concrete genera and Gray to retain large comprehensive ones.



Thomas Nuttall in age

Academy of Natural Sciences of Philadelphia so that there repose his early types. Probably the impetus to a private herbarium began with his move to New England, it seeming best to have his plants with him. Beginning with the Arkansas collections, more ample material is to be found at the British Museum than at Philadelphia, and so we may consider that his later types are in London, with isotypes at Philadelphia.[107]

Nuttall's specimens are unusually small, even for his period, and it would seem that they were intentionally so in order to simplify transportation. At the British Museum there seem to be more specimens, rather than ones of larger size than at Philadelphia. Doubtless, many that he would have considered as suitable duplicates for distribution as exchanges, have been retained and now mounted together so as to supply the full sheets at London. The data are unfortunately always meagre, even though in publication Nuttall had much to say about his plants. Did his interesting remarks come from his memory or from actual records?

In spite of the fact that the case of *Lindernia grandiflora,* already mentioned, suggests the former, I think that the latter is the right alternative. Usually Nuttall's localities prove to be accurate, and we know how full a journal he kept on the Arkansas journey. He seems also to have kept field-books of plant-descriptions, as witness the one that he sent to Barton in 1812. There should have been once an extensive and invaluable series of manuscript books to tell both of his travels and his collections. I made inquiry for such when at the British Museum in 1930, but was informed that no papers had been received by that institution with his herbarium. Yet Dr. Jepson, who visited Nutgrove Hall, tells us that Dixon Nuttall assured him that " all such material [was] taken to London shortly after his death." [108] Perhaps like the Barton papers, a collection of them exists somewhere, their nature wholly unsuspected. Or perhaps, as can well be the case, these precious records were long ago destroyed, and we shall never know what they would have revealed to us.

APPENDIX

(A) TERMS OF AGREEMENT, DATED APRIL 7, 1810, BETWEEN BARTON AND NUTTALL.

I agree to pay all the expenses of the journey, from the time of your setting out to the time of your return. You are to keep an exact account of all the expenditures. Besides paying the expenses of the journey, I hereby agree to give you, on your return to Philadelphia, or within forty days after your return, at the rate of Eight dollars the month, lawful money of the United States.

[Signed] Benjamin Smith Barton.

I agree to the above terms. [Signed] Thomas Nuttall.

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[107] There are also many specimens from Nuttall in the Liverpool Botanic Garden Collection as announced in the " Handbook and Guide to the Herbarium Collections in the Public Museums, Liverpool," page 55, 1935, a pamphlet kindly loaned me by Dr. H. W. Rickett of the University of Missouri.

[108] Madroño 2: 146. 1934.

You are to keep an exact Journal of your daily travels, and of the observations which you may make. This journal, and all the observations you may make, are to be my exclusive property; and no parts of them are to be communicated, without my consent, to any person. Should I ever publish the journal, I hereby promise and bind myself to make a public acknowledgement, that the journey was performed by you, and to give you full credit for what services you may have rendered to me. You will be entitled to a part of all the specimens of animals, vegetables, minerals, Indian curiosities, etc., which you may collect; but these you are not to dispose of without my consent, as they might otherwise fall into the hands of persons who would use them to my disadvantage.

[Signed] Benjamin Smith Barton.

I agree to the above terms. [Signed] Thomas Nuttall.

[All the above, except Nuttall's signature, in Barton's handwriting.]

(B) " DIRECTIONS FOR MR. THOMAS NUTTALL."

You are to proceed from Philadelphia to Pittsburgh, by the way of Lancaster, Chambersburgh, Bedford, &c. I wish you to make a short stay at Bedford and its vicinity, examining the vegetables, &c., there. You will, I think, find something worthy of attention, in the way of the impressions of organized bodies, &c. Look for Elk-nut and Streptopus, especially about Ligonier.—I do not wish you to make much stay at Pittsburgh: three or four days will be sufficient. Should you be delayed longer by any circumstances, an excursion up the Alleghaney River, may be profitable. Before leaving Pitt. put your communications, &c., into the hands of Mr. Geo. Stevenson.—From Pitt. proceed by the route which shall be recommended to you, to Sandusky. I wish you, if not inconvenient, to go down the Ohio to the mouth of Big Beaver, where you will find Frasera, of which I wish a few pounds of good roots; and from thence to the Mahoning-Salt-Sprgs. on a western branch of Beaver. These springs will be worth examining for their vegetable and other products. Look for muriatic plants, such as Salicornia, Glaux, Triglochin, &c.; and for a fine blue ea[r]th, which is said to be found about the springs. Make inquiries about the strength of the salt-water, the quantity of salt made, &c. Here, also, without going there, you will learn something about the salt works at Yellow Creek. Why is this creek so called?—At the Mahoning Salt-works, inquire if Mammoth or other similar bones have not been found there.—From this, proceed, by the nearest way, to Sandusky, where I wish you to stay at least so long as to acquire five good specimens of the Wyandot-language. Here, also, you may expect to find some curious plants; and dont omit to make inquiries about the disease of Goitre; its comparative frequency in males and females; whether it is often connected with fatuity, &c. Examine, with much attention, the species of Aesculus at Sandusky; and look for the large Nelumbium. Perhaps, it is distinct from the kind near Philadelphia. What do the Wyandots call this Nelumbium? I need not say, that ripe seed of it, in the fall, will be acceptable.—Numbers of the Indians here. See the article " Indians," in the queries, p. 3, 4, &c.

From Sandusky, proceed to Detroit, from whence I expect to hear very minutely from you. You will, necessarily, be delayed here sometime: but if the weather be favorable, I advise you to proceed, without much delay, to explore the country north or west, as may be represented most advantageous to you. Upon the whole, perhaps, it will be best to proceed westward, towards Chicago, on Michigan, where please to deliver your letter to Mr. Irvin, and make with him all the necessary arrangements for the safe keeping, &c., of your specimens, &c., &c. Here, as well as at Detroit, be sure to inquire for Mr. Dixon, to whom I have given you a letter.

From Chicago, unless you should see substantial reasons to deter you from this rout, take your course, nearly northward, along the lake to lat. 44°. Here I wish you to turn to the westward, towards and among the Winnebagoes, of whose language, customs, &c., I am greatly desirous to receive information. You will, doubtless, find many curious plants here. I presume a residence of fifteen or twenty days, among and near to the Winnebagoes, will be highly profitable. Of these Indians, we know very little, except from Capt. Carver. Their traditions. Did they come from the south or south-west? As soon as possible, send me a good specimen of their language.

From the castle of the Winnebagoes, proceed to the Menominies castle, where your delay need not be great. Thence, after exploring a part of the country about Green-Bay, take your course, if this appear convenient, in a direction nearly north-west, along the Meno[mi]nies-River, to Lake Superior, about the deep sinus ma[r]ked Pt. Keewena in McKenzie's map. Now pursue the southern shore of Superior, by land or by water, as shall be most advisable, to Fon du Lac. From this, with such digressions as may seem proper, take your rout along the lake, north-east, to the "Grand Portage," beyond which to the east or north I do not wish you to proceed, unless to examine some of the islands in the lake.

From the Grand-Portage, or its vicinity, take nearly a north west course, by the lake of the woods, to Lake Winnipic, provided you shall find no obstacles from the British traders, which considering the useful and innocent nature of your business, I do not expect.—These two lake[s], especially Winnipic, I wish you to explore with great and minute attention, for plants, animals, minerals, &c. Obtain a list of the fish of these lakes, with their common names. The meaning of the word *Winnipic,* and the true Indian spelling. About these lakes, you will, doubtless, find much to interest you; and, therefore, I do not pre[te]nd to prescribe the term of your delay. I presume you will [find] it important to take excursions from Winnipic, both eastward and westward, especially perhaps to acquire some information about the course, height, nature, &c., of the range of mountains, laid down by McKenzie, along Poplar River. What Populus grows here?

After leaving Winnipic, endeavour to proceed, in a westerly direction to about latitude 55°, on Beaver-River, beyond which, to the north or to the west, I do not wish you to proceed, unless you shall find, from correct information, strong inducements to do so.—You are now to shape your course, in a southeast direction, perhaps by the places marked Manchester-House and Hudson-House, so as to fall upon the waters of the Missouri-River, perhaps about the Pawnee-village, laid down in the map. You are then to take your course eastwardly, so as to reach the main branch of the Mississippi, down which you are to proceed to the Falls of St. Anthony; and from thence, in the course that shall appear most interesting to you, to about the mouth of the Illinois; and from thence to Ft. Vincennes, on the Wabash, where I have no doubt, that you will be kindly received by Governor Hamilton, and others.—I now leave you to pursue the course you shall think proper, through Kentucky (or Tennessee) and Virginia, to Philadelphia. In Virginia, however, I wish you may make it convenient to visit (with a proper guide) the Peaks of Otter and the Salt Pond Mountain; and my Brother Richard P. Barton, who resides in Frederik-county, at the distance of a very few miles from Winchester. He will receive you with hospitality; and, if necessary, will assist you with some money, *on my account*.

In the preceding notes, I have not said where you are to pass the *winter*-season. On this subject, you will endeavour to procure the best information, both for your own convenience, and to my advantage. Probably, you may find a good lodging in some of the British factories.—Endeavour to begin your return in the spring, either in April or May, so as to examine, to the greatest advantage, the early plants of the mountains, plains, &c.

In supplying yourself with an Indian guide, be cautious to obtain the best information, as to the character for integrity, sobriety, &c., of the guide. It is likely that you will stand in need of a guide from Detroit to Chicago. At all events, I presume you will require one to conduct you from Chicago to the Winnebagoes, and from thence to Superior. I have no doubt that Mr. Clay's letter to Mr. Irvin will be of much use to you. Ask his advice; but always remember, that, next to your personal safety, science, and not mere conveniency in travelling, is the great object of the journey. In pursuit of curious or important objects, it will often be necessary to court difficulties, in travelling.

[Signed] Benjamin Smith Barton.
Philadelphia,
April 8th, 1810.

exact copy
B. S. B.

(C) List of articles belonging to me, which Mr. Th. Nuttall has in his possession: viz.

1. One thermometer, in a case.
2. One steel-pen.
3. Hoffman's Flora Germanica, one volume.
4. Five blank Books.
5. One double-barrel Gun, with cover, &c.
6. One Pistol, with key, &c.
7. One Dirk, in case.
8. One

There is also the following bill, in Nuttall's handwriting:

1 lb. gunpowder	$1.00
a — powder horn	1.50
a — shot belt	.87½
a — pair of small scales	1.25
4 quires of paper	1.25
	$4.87
	12½
	4.99½

Paid 5 dollars, in full, of the above.
Mr. Nuttall—April 12th

[in Barton's handwriting.]

(D) Excerpts from B. S. Barton's "Miscellaneous Facts concerning the first discovery of the genus of Bartonia, accompanied with a drawing of one of the species," a Manuscript preserved at the American Philosophical Society's library in Philadelphia.[109]

The new genus of Bartonia was so named by Mr. Thomas Nuttall.

I became acquainted with this young Englishman in Philadelphia several years ago; and observing in him an ardent attachment to, and some knowledge of, Botany, I omitted no opportunity of fostering his zeal, and of endeavouring to extend his knowledge. He had constant access to my house, and the benefit of my botanical books.

In 1810 I proposed to Mr. Nuttall the undertaking an expedition, entirely at my own expense, and under my immediate direction, to explore the Botany, &c. of the Northern and North-Western parts of the United-States, and the adjoining British Territories. Accordingly, having provided him with a *special* passport from the President of the United-States, Mr. Madison, and with whatever else I deemed necessary, together with a considerable collection of ms. queries and memoranda, Mr. Nuttall took his departure from Philadelphia in April, 1810.

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[109] In his "Biographical Sketch of Professor Barton," read before the Philadelphia Medical Society February 16, 1816, his nephew, William P. C. Barton, says that "three days before his death he wrote a memoir on a new genus of plants, named in honour of him, and requested me to make a drawing of one of the species to accompany it. This I did, and at the next meeting of the Philosophical Society, I read this memoir for him." Although the nephew expected its publication in the Society's Transactions, all that seems to have ever appeared was what he himself incorporated as a footnote on pages 24 and 25 of the "Sketch."

His route was by Pittsburg to Detroit, Michilimakinak, Fox River, the Falls of St. Anthony, &c. He deviated, however, from the rout which had been pointed out to him, having been prevailed upon to ascend the Missouri in company with some of his own countrymen, some Americans and others, whose objects were principally trafick.

He proceeded to the Arikanee[110] towns; from thence to the territory of the Mandan Indians, in the boat of a Spanish gentleman; and in the same vessel descended the Missouri to St. Louis, near the confluence of this great river with Mississippi, in the autumn of 1811.

In the latter end of the year 1811, Mr. Nuttall returned to England by the way of New Orleans. Previously to his departure he transmitted to me a number of the dried specimens and seeds which he had collected [including Bartonia]. . . . At the same time he sent me a ms. book, in which he has given pretty full descriptions of . . . Bartonia superba and B. polypetala.[111]

In England Mr. Nuttall became acquainted with Mr. Frederick Pursh, whom also I had formerly employed, at my own expense, to explore the botanical treasures of the United States.

To Mr. Pursh, among others, he communicated what knowledge he possessed of the new American plants and likewise furnished this botanist with dried specimens of them. Pursh *adopted from Nuttall* the generic name of Bartonia, and by this name gave an account of one of the species (from dried specimens) in the *Botanical Magazine*, n. 307, pl. 1487. The Bartonia decapetala of this work is the Bartonia superba of Nuttall. The German botanist has since, in his Flora of North-America, vol. 1, p.   changed the trivial name of decapetala to that of ornata: and informs us that he has the satisfaction of seeing the plant in flower and in great perfection, in the Garden of Sir.   Bourke Lambert. It had previously flowered with Mr. Nuttall.*

I have thought that these memorandums concerning the first discovery and naming of the new American plants might not prove altogether unacceptable to the botanists. At the same time it afforded me an opportunity of doing some justice to the zeal and services of Mr. Nuttall, who has contributed essentially to extend our knowledge of the North-Western and Western Flora of North-America; and to whom the work of Frederick Pursh is under infinite obligations.

[110] Word emended, perhaps by W. P. C. Barton to make it clear to the printer, to "Mikanee" as it appears in his "Sketch;" of course "Arikaree" was meant.

[111] End of the portion quoted by W. P. C. Barton in 1816.

* In a letter dated Sutton, Lancashire, Feb^y^ 24^th^ 1813, Mr. Nuttall thus writes to me. "In the 307 number of the Botanical Magazine, tab. 1487, I did myself the pleasure of giving your name to a very splendid plant, which was figured from a dried specimen; and it afterwards flowered with me from seeds. A Mr. Pursh, with whom I became accidentally acquainted in London has in my absence, as you will perceive, taken his opportunity of advertising himself at my expense, at the close of my communication."

I might say something more in this place, concerning my claims to the collections of these two travellers and botanists; but this is rather a matter which respects the individuals concerned than the Public.[112]

(E) THE FINDING OF THE BARTON PAPERS.

VIOLETTA W. DELAFIELD

"Montgomery Place," at Annandale-on-Hudson, Dutchess County, New York, is an old house which was built in 1802 by Janet Livingston, widow of General Richard Montgomery. From the time that it came into our possession in the autumn of 1921, we realized that large numbers of papers and documents belonging to former residents, were stored everywhere, in odd nooks and corners, in the study, and in cases in the attic. One of the chests contained papers, proof sheets. letters, etc. which had belonged to Dr. Benjamin Smith Barton. It is not strange that these should be there, for his only surviving child Thomas Pennant Barton married in 1833, Cora, only daughter of Edward Livingston to whom the place had been left by his sister.

Though many of the papers had been sorted and classified, those which had belonged to Dr. Barton were at first given only a hasty inspection, and it was not until last winter when the Library Committee of the Garden Club of America planned an exhibition of early works in botany and horticulture published in this country, that we decided to investigate further. Besides the chest already mentioned we found an old portfolio in another box hidden under the overhanging eaves of the attic, and which was only discovered by chance when some old trunks and furniture were moved recently. It contained many of the original drawings made by William Bartram for "The Elements of Botany," the first volume of which was published by Dr. Benfamin Smith Barton in 1803. There were besides many colored drawings by Turpin, W. P. C. Barton, Dr. Barton himself, and other artists which were probably intended to illustrate other works. There were also copper plates made for the engravings.

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[112] The last sentence has been deleted by a line run through it.

Miscellaneous Eastern Polemoniaceae[1]

Edgar T. Wherry

In bringing to a close my series of studies on the members of the Polemonium Family occurring east of the Mississippi River, a key to the genera concerned, simplified to cover only eastern representatives, is first given:

POLEMONIACEAE: KEY TO NATIVE AND ADVENTIVE EASTERN GENERA

- Sepals all alike, entire.
  - Calyx-tube remaining unbroken to maturity of capsule.
    - Leaves pinnately compound; calyx-tube herbaceous, markedly accrescent.
      - Duration perennial; flowers borne in cymose clusters; bracts small ....*Polemonium.*
      - Duration annual; flowers borne singly in the axils of large bracts ....*Polemoniella.*
    - Leaves entire to pinnatifid; calyx-tube more or less herbaceous, not markedly accrescent. *Collomia.*
  - Calyx-tube becoming ruptured by the maturing capsule.
    - Leaves entire or essentially so; corolla salverform ....*Phlox.*
    - Leaves lobed or dissected.
      - Plants coarse biennials with numerous leaves and thyrsoid inflorescence; corolla red, open salverform; seeds obliquely polyhedral, buff, translucent ....*Ipomopsis.*
      - Plants delicate annuals with few leaves and corymbose to capitate inflorescence; corolla violet or lavender, open salverform to funnelform; seeds ellipsoidal, light to dark brown, opaque ....*Gilia.*
- Sepals unequal, spinulose-lobed; calyx-tube unbroken to maturity of capsule .....*Navarretia.*

Identity of **Polemonium ciliatum** Willd. ex Roem. & Schult.

In the course of collecting material for the present article, a question arose as to the identity of "*Polemonium ciliatum.*" This had been sent to Europe by Muhlenberg from Pennsylvania, presumably from Lancaster County, where he lived, and was described[2] as having acute leaf-segments and calyx-lobes. In compiling the Kew Index, Jackson[3] recognized that it represented a *Phacelia*, but referred it to *P. fimbriata* Michx., overlooking the facts that this has obtuse leaf-segments and calyx-lobes, and grows only farther southwest. Brand[4] at first accepted this interpretation, but later[5] allocated this supposed *Polemonium* to *Phacelia purshii* Buckley. That this is the most satisfactory solution of the problem is affirmed here, in order that future workers may avoid overlooking Brand's final conclusion.

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[1] Contribution from the Botanical Laboratory and Morris Arboretum of the University of Pennsylvania.

[2] Systema veg. **4**: 792, 1819.

[3] Index Kewensis **3**: 584, 1894.

[4] In Engler's Pflanzenreich **IV. 250**: 47, 1907.

[5] In Engler's Pflanzenreich **IV. 251**: 62, 1913.

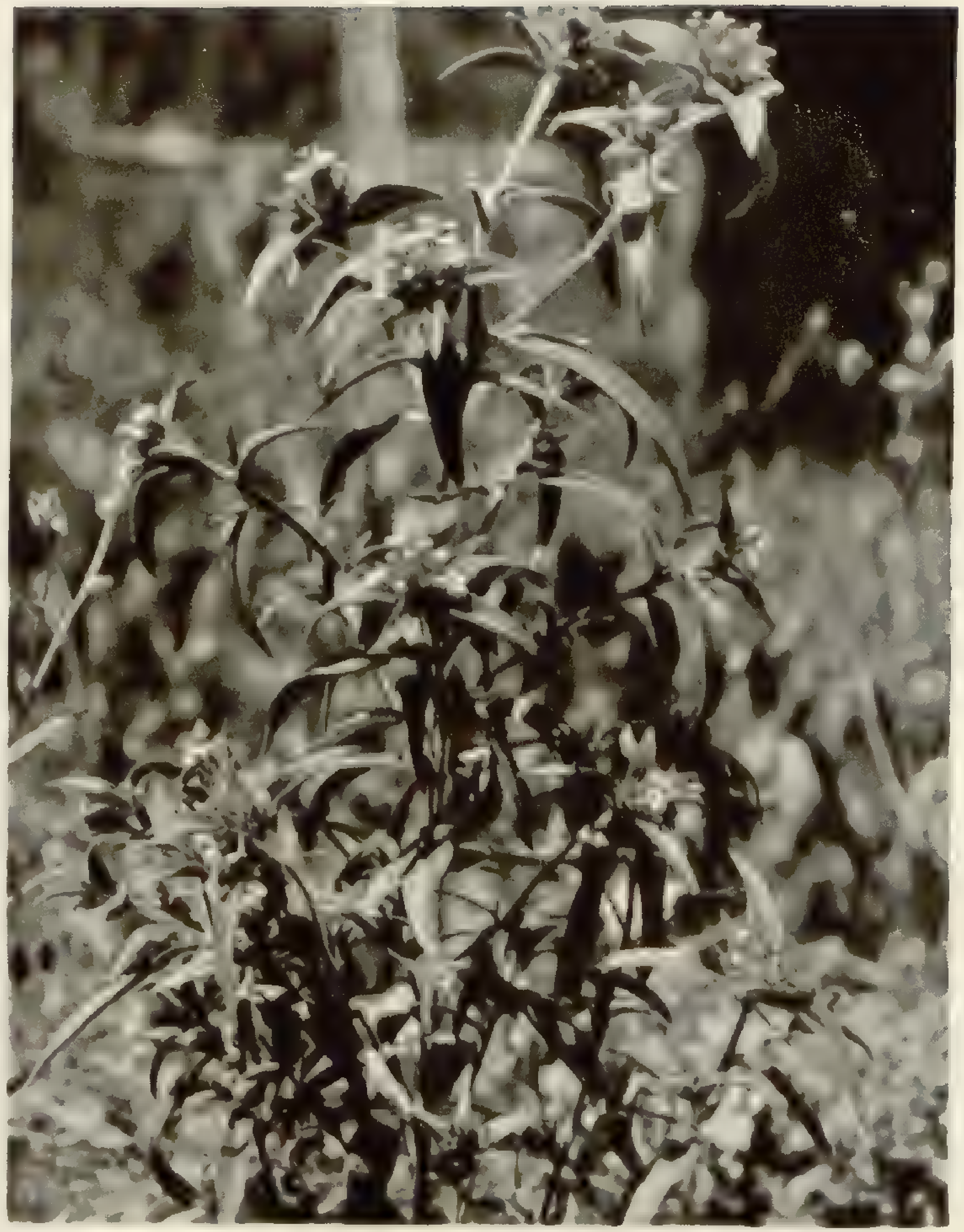

FIG. 1. *Collomia linearis.*
Oregon.

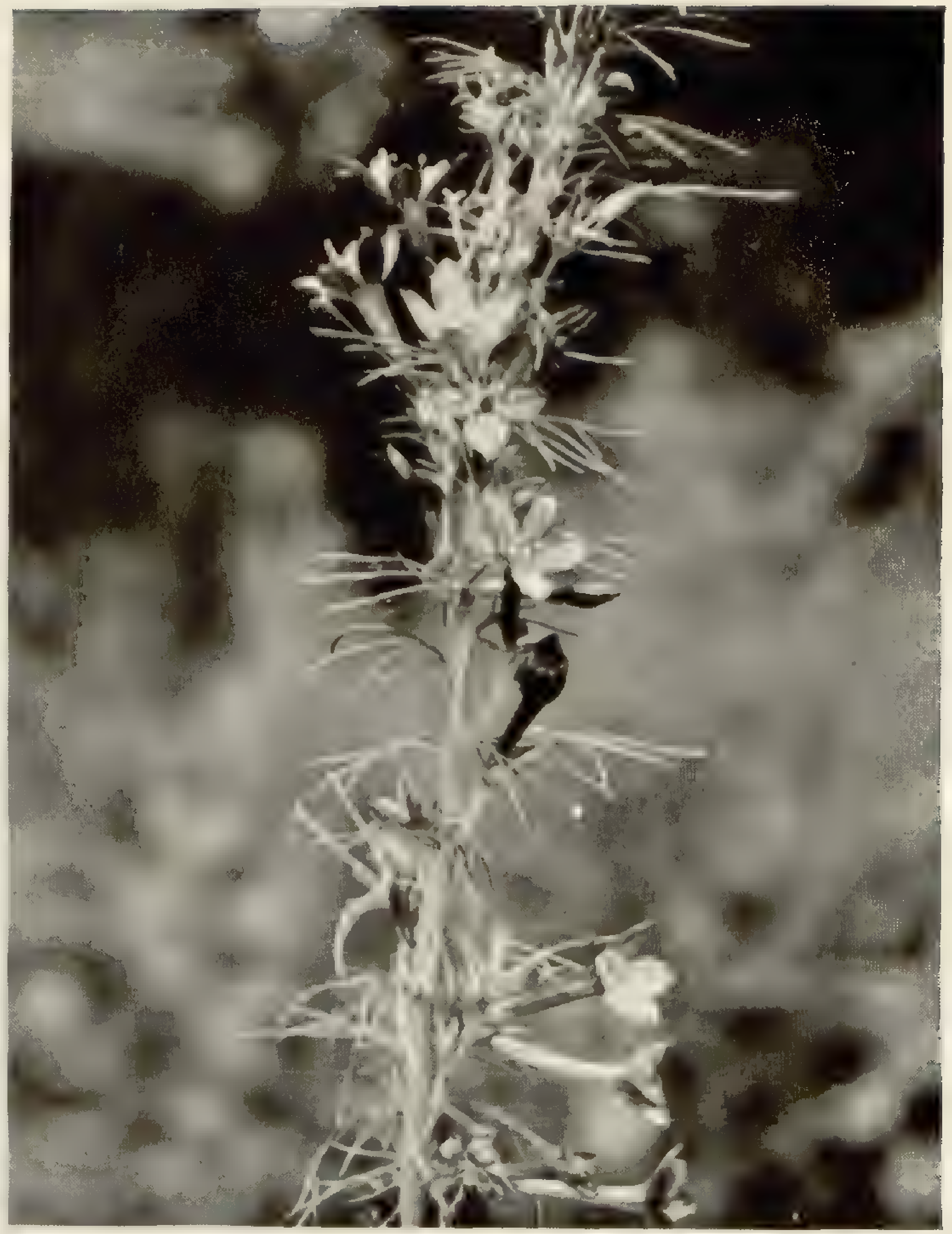

FIG. 2. *Ipomopsis rubra.*
In cultivation.

COLLOMIA NUTTALL

In 1811 Thomas Nuttall collected in the northwestern prairie region, chiefly along the lower Cheyenne valley in what is now South Dakota, a small annual which obviously belonged to the *Polemoniaceae*, but was peculiar in that its seeds became mucilaginous when moistened. He decided that this represented a previously unrecognized genus, including also one or two South American plants which had been assigned to *Phlox*, and proposed[1] for this the name *Collomia*, from the Greek word for glutinous material. Gray[2] at first accepted the genus as valid, transferring into it several plants previously classed as Gilias. Subsequently, however, he recognized[3] that what he had regarded as a differentiating character, unequal insertion of stamens, was shown by certain unmistakable Gilias; despairing of finding any other distinctive feature, he proceeded to reduce *Collomia* to the status of a Section under *Gilia*. A valid and fundamental basis for generic distinction was found soon afterward, however, by Greene,[4]—in typical Gilias the calyx-tube is ruptured by the maturing capsule, while in the Collomias the calyx is sufficiently accrescent to remain intact to maturity. This was ignored by Gray and by the editors of the 6th and 7th editions of his Manual of Botany, where the sectional status of *Collomia* is maintained; but most recent workers have admitted the generic independence of *Collomia*, which is emphatically favored here. The genus comprises approximately 5 perennial and 5 annual species of western North America, with 2 or 3 annuals in southern South America. Only Nuttall's original species ranges sufficiently far to the east to be covered in the present article.

Collomia linearis Nuttall.

History.—The original species on which the genus *Collomia* was based was named by Nuttall[1] *C. linearis* in reference to its dominantly linear leaves. It was mistakenly transferred to the genus *Hoitzia* (Jussieu 1789) by Sprengel[5] in 1825, while many years later, under the circumstances above discussed, Gray[3] made it *Gilia linearis*. It was renamed *Collomia parviflora* by Hooker[6] and several variants have received special names: a broad-leaved phase *C. lanceolata* Greene;[7] a stunted one *C. linearis* var. *humilis* Brand,[8] one with the bracts somewhat mottled *C. linearis* var. *picta* Lunell,[9] and still another with profuse branching *C. linearis* var. *congesta* Lunell.[10]

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[1] Genera N. Am. Plants **1**: 126, 1818.

[2] Proc. Amer. Acad. Arts Sci. **8**: 258, 1870.

[3] Proc. Amer. Acad. Arts Sci. **17**: 223, 1882.

[4] Pittonia **1**: 122, 126, 1887.

[5] Systema veg. **1**: 626, 1825.

[6] Curtis's Botanical Magazine **56**: pl. 2893, 1829.

[7] Plantae Bakerianae; ex Brand in Engler's Pflanzenreich **IV. 250**: 49, 1907.

[8] In Engler's Pflanzenreich **IV. 250**: 49, 1907.

[9] Bull. Leeds Herb. **2**: 7, 1908.

[10] Am. Midl. Nat. **4**: 512, 1916.

Geography.—Botanical exploration of western North America subsequent to Nuttall's time showed *Collomia linearis* to be widespread there, and by 1870 Gray[1] was able to state the range as " Both sides of the Rocky Mountains, north to Mackenzie River; also on the shore of New Brunswick, Fowler, perhaps a waif." With respect to the final item, it should be noted that subsequent collecting has shown that the species is present at a number of stations in both New Brunswick and Quebec, in a region where many northwestern plants occur as relics of a former cross-continental distribution, disrupted by the last ice sheet. These eastern colonies are accordingly here regarded as native, although the plant is unquestionably of recent introduction at several intervening points. On the accompanying map only records east of longitude 100° are shown.

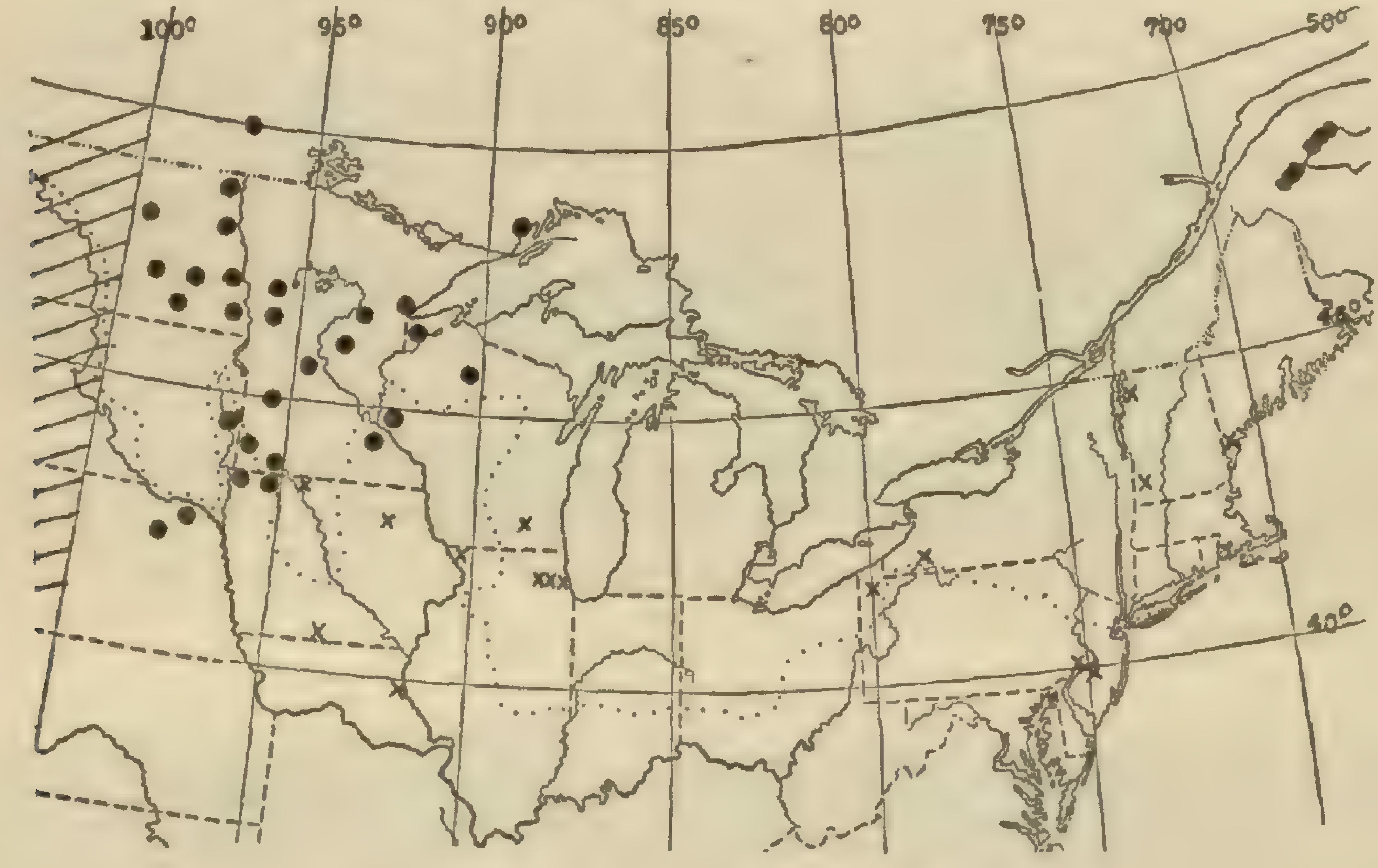

FIG. 1. Distribution of *Collomia linearis*.

[ILLINOIS: Becoming increasingly abundant as a weed, especially along railroad lines, in Cook^x, Du Page^x, Jo Daviess^x, and Kane^x counties.]

IOWA: Recorded from Chickasaw^x, Decatur, Dickinson, Emmet^x and Lyon counties.

[MAINE: Adventive in York^x County.]

MINNESOTA: Widespread northward, specimens having been seen from 10 counties: Aitkin, Becker, Chippewa, Goodhue, Jackson, Mille Lacs, Otter Tail, Pipestone, St. Louis and Stearns.

[MISSOURI: Entering along a railroad in Marion^x County.]

NEBRASKA: Common westward, and ranging east of 100° in Antelope and Cedar counties.

[NEW JERSEY: Collected once as a weed in Camden^x County.]

[NEW YORK: Adventive along a railroad in Cattaraugus^x County.]

North Dakota: The county list reaches a maximum of 15 in this state, although only part of them are toward the eastern end: Barnes, Benson, Cass, Grand Forks, La Moure, Pembina, Richland, and Stutsman.

[Pennsylvania: Found as a weed at opposite corners, in Crawford^x and Philadelphia^x counties.]

South Dakota: Widespread in the western part, and collected in one eastern county, Brookings.

[Vermont: Adventive in waste places in Bennington^x and Chittenden^x counties.]

Wisconsin: Recorded from Douglas, Jefferson^x, Pierce, and Price counties, and apparently native in most of them.

Canada: Extending from the northwest across Manitoba to westernmost Ontario, in Thunder Bay County. In the St. Lawrence valley recorded from 3 or 4 stations each in Restigouche-Madawaska County, New Brunswick, and Bonaventure County, Quebec.

Ecology.—*Collomia linearis* is a pioneer plant, appearing on gravel banks, sand-hills, and burned-over land at an early stage in their revegetation. It persists into intermediate successional stages, but tends to die out as climax conditions develop. Some of man's activities favor its spread, and it appears to be expanding its range over the northeastern states along fence-rows, railroad embankments, and waste-places generally, although there is no indication of its becoming a serious weed. Its tiny pink[1] flowers are produced for 2 or 3 months in summer, but seem too inconspicuous to attract insects, and no data are available as to its pollination.

Variation.—In response to differences in availability of moisture and of nutrients, this species varies from a slender, narrow-leaved simple-stemmed plant a few centimeters tall to a robust lanceolate-leaved plant with a much-branched inflorescence. The following forms may be distinguished:

FORMS OF COLLOMIA LINEARIS.

Stunted. *C. l.* var. *humilis* Brand.
Luxuriant. *C. l.* var. *congesta* Lunell.
Broad-leaved. *C. lanceolata* Greene.
Mottled-bracted. *C. l.* var. *picta* Lunell.

Cultivation.—In the text accompanying the figure of this plant in the Botanical Magazine, Hooker[2] noted that it had been "introduced by Mr. Douglas to the garden of the Horticultural Society," and that it had proved to be a "hardy annual, flowering nearly the whole summer." Its flowers are too inconspicuous, however, for it to have found general favor, and its seeds are rarely offered for sale. Several other members of the genus, with more showy flowers, are often cultivated.

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[1] In Maerz & Paul's Dictionary of Color 41-E-2 to 41-J-5 (or 49-E-6.)

[2] Curtis's Botanical Magazine **56**: pl. 2893, 1829.

IPOMOPSIS MICHAUX.

A showy red-flowered member of the *Polemoniaceae* native to the southeastern United States, classed by Linné[1] as a member of his genus *Polemonium* and by Lamarck[2] as belonging to Jussieu's *Cantua,* was made by Michaux[3] the type of an independent genus, *Ipomopsis.* Two years later Persoon[4] referred this plant, with a question mark, to the Ruiz and Pavon genus *Gilia.* In 1818 Nuttall,[5] "for the sake of euphony," altered Michaux's name to *Ipomeria,* and still later Rafinesque[6] put forward a wholly new one, *Batanthes.* Bentham,[7] Gray,[8] and most recent authors have concurred in Persoon's generic assignment, although Greene[9] urged the acceptance of Rafinesque's genus name for some of the species. On the basis of the characters given in the key, the plant is here regarded as probably worthy of generic segregation, and a return to the earliest name for it, that of Michaux, is favored. The genus comprises about 10 western species, and a single eastern one.

Ipomopsis rubra (Linné) Wherry, comb. nov.

History.—An extraordinary number of name-combinations have been applied to the species under discussion, the more noteworthy being: *Polemonium rubrum* Linné,[1] *Cantua pinnatifida* Lam.,[2] *C. coronopifolia* Willd.,[10] *Ipomopsis elegans* Michx.,[11] *Cantua thyrsoidea* Juss.,[12] *Gilia coronopifolia* Pers.,[4] *Cantua elegans* Poir.,[13] *Ipomeria coronopifolia* Nutt.,[5] *Navarretia rubra* Kuntze[14] and *Gilia rubra* Heller.[15] Since no one has heretofore associated the earliest species name with that of the earliest genus, a new combination is here called for. A slender variant which develops in Florida sand barrens has been named successively *Cantua floridana* Nutt.,[16] *Gilia floridana* Don,[17] and *G. rubra* var. *capillacea* Brand.[18] Several color forms have also been assigned horticultural names, such as "picta" for one with the corolla yellow within, "lutea" yellow throughout, and "superba" purplish red.

[1] Species Plantarum: 163, 1753.
[2] Tabl. Encycl., Ill. gen. **1**: 473, 1791.
[3] Flora Boreali-Americana **1**: 141, 1803.
[4] Synopsis plantarum **1**: 187, 1805.
[5] Genera N. Am. Plants **1**: 124, 1818.
[6] Atlantic Journ.: 145, 1832.
[7] In De Candolle's Prodromus **9**: 313, 1845.
[8] Proc. Amer. Acad. Arts Sci. **8**: 275, 1870.
[9] Leaflets Botan. Obs. & Crit. **1**: 224, 1906.
[10] Species Plantarum **1** pt. 2: 879, 1797.
[11] Flora Boreali-Americana **1**: 142, 1803.
[12] Ann. Mus. Paris **3**: 119, 1804.
[13] Encycl. meth., Bot., Suppl. **2**: 80, 1811.
[14] Rev. Gen. Plant. (1): 433, 1891.
[15] Contr. Herb. Franklin & Marshall **1**: 81, 1895.
[16] J. Acad. Nat. Sci. Phila. **7**: 110, 1834.
[17] Gen. Hist. Dichl. Plants **4**: 245, 1838.
[18] In Engler's Pflanzenreich **IV. 250**: 116, 1907.

Geography.—As a native plant, *Ipomopsis rubra* ranges from central Texas to Florida, and sporadically northward to southern Oklahoma and southeastern North Carolina. It has also escaped from cultivation northward:

Alabama: Reported in but four counties, Autauga, Baldwin, Bibb, and Mobile.

Arkansas: Seen by Nuttall in the southeastern prairies.

[Delaware: Escaped in Sussex^x County.]

Florida: Widespread yet not frequent, specimens having been seen from but 8 counties: Brevard, Duval, Escambia, Lake, Levy, St. Johns, Sumter, and Volusia.

Georgia: Known in Chatham, Clarke, Cobb, and Gwinnett counties.

[Illinois: Adventive in Winnebago^x County.]

[Maryland: An escape in Wicomico^x and perhaps other counties.]

[Massachusetts: Recorded from Franklin^x County.]

[Michigan: Has succeeded in establishing itself in Allegan^x and Oakland^x.]

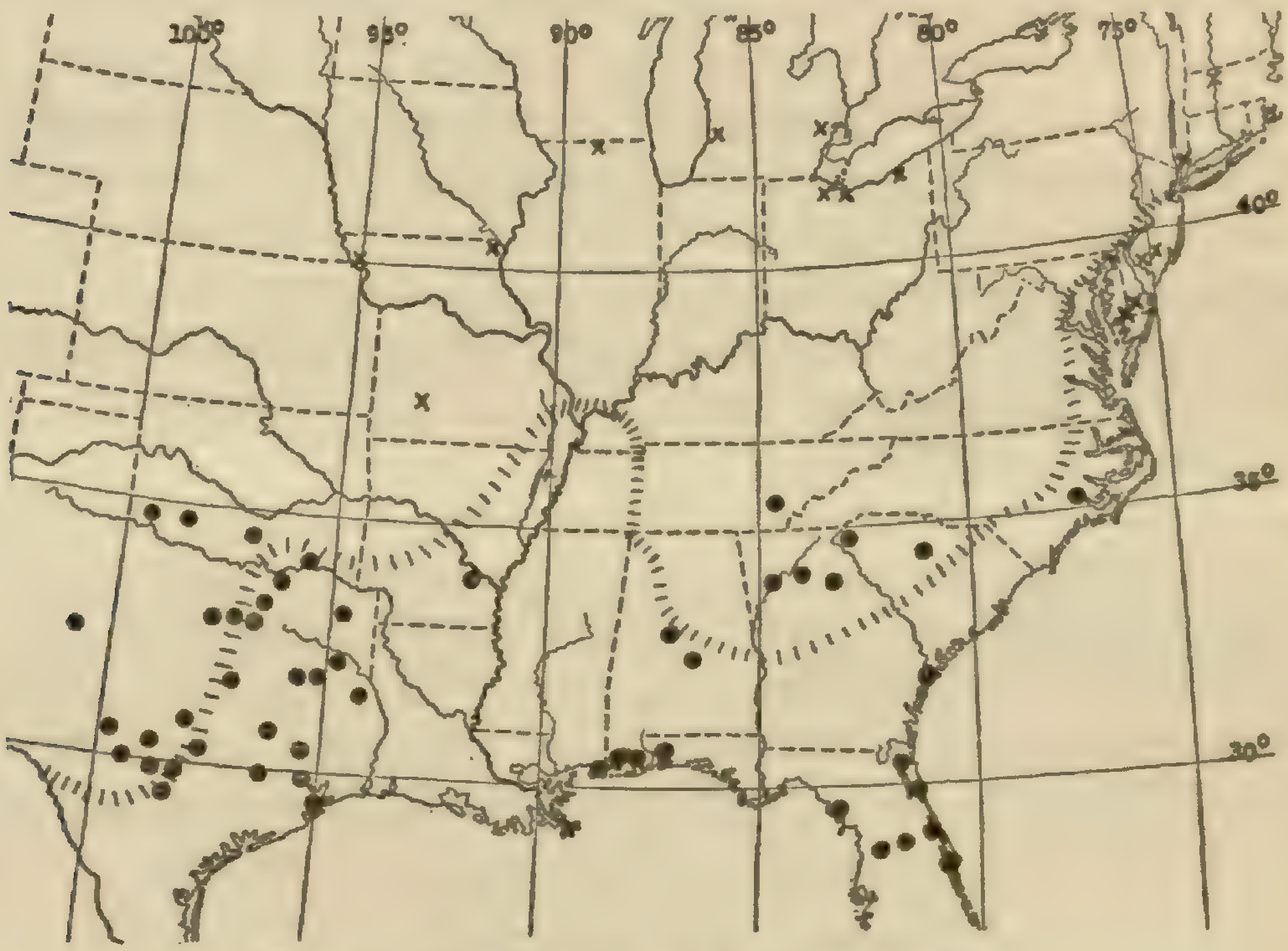

Fig. 2. Distribution of *Ipomopsis rubra*.

Mississippi: Known thus far only along the coast in Jackson County.

[Missouri: Apparently escaped in Clark^x, Greene^x and Holt^x counties.]

[New Jersey: Established at several points in Atlantic^x and Cumberland^x.]

[New York: Escaped in Westchester^x County.]

North Carolina: Specimens preserved from Craven County probably represent a native colony. The type locality was given as "Carolina."

[Ohio: Recorded as escaping in Erie^x, Lake^x, and Sandusky^x counties.]

Oklahoma: Specimens seen from Choctaw, Comanche, Jackson and Murray.

South Carolina: Definitely reported only from Fairfield and Oconee counties.

Tennessee: Recorded in McMinn County.

TEXAS: Abundant and widespread, there being at least 25 county records: Anderson, Austin, Bexar, Brazos, Burnet, Cherokee, Collin, Comal, Dallas, Fannin, Galveston, Gillespie, Harris, Kendall, Kerr, Kimble, McLennan, Mitchell, Montgomery, Morris, Parker, Rusk, San Augustine, Tarrant and Travis.

[VIRGINIA: Escaped in Chesterfield[x] County.]

Ecology.—Ipomopsis rubra is chiefly an occupant of sandy or gravelly land, where mineral-rich subsoil or admixture of shells prevent the development of high acidity. When it invades real sand-barrens it becomes rather delicate in aspect, and as noted under History, has received varietal or even specific segregation. Its biennial duration and the reduced transpiration surface of its pectinately dissected foliage mark it as a moderate xerophyte, although it scarcely invades the drier parts of Texas. Requiring abundant light, it is best developed in early successional stages, and dies out from climax forests. The flowers begin to open in late May toward the southern border of the range, in late June further north, and continue to appear for two or even three months. Their open-salverform corolla with red exterior[1] and more or less orange interior are adapted to attract humming-birds, which visit the colonies in abundance. Large quantities of viable seeds are produced, which germinate freely in the Spring, forming the first season dense rosettes; many of these are killed during the succeeding winter, but those which survive begin in early Spring to send up the season's blooming stalks.

Variation.—This species varies considerably in size in relation to availability of nutrients in the soil, but the differences are not here regarded as sufficiently significant to justify nomenclatorial recognition.

Cultivation.—This showy plant early attracted the attention of Catesby, who sent seeds to the Eltham garden, where it was studied and described by Dillenius[2] in 1732. It soon found its way into many other gardens, and several of the species names assigned to it were based on cultivated material. In the trade, both in Europe and America, the seeds are usually offered under the name *Gilia coronopifolia.* It is of easy culture, though succeeding best in a rather dry, sandy soil, and tending to succumb to fungus attack in moist locations.

GILIA RUIZ AND PAVON

The genus name *Gilia* was proposed by Ruiz and Pavon[3] in 1794, a single South American species, *G. laciniata,* being described by them[4] five years later. That representatives of this genus occur also in North America appears to have been first recognized by Sprengel,[5] who in 1825 listed 5 species, four of which had been originally described under other genera. From that time on the size of the genus increased rapidly, especially through the merging with it of many other genera, until it now, as often interpreted, comprises over 100 species. Though freely admitting that valid grounds for generic segregation are difficult to find, I feel that the " lumping " process has gone rather too far, and prefer to maintain such groups as *Ipomopsis* and *Navarretia* as distinct.

---

[1] The color of the exterior is close to the pure scarlet, 1-L-12, of Maerz & Paul's Dictionary of Color.

[2] Hortus Elthamensis **2**: 321, pl. 241, f. 312, 1732, as Quamoclit pennatum, etc.

[3] Flora Peruv. & Chilen. Prodr. **1**: 25, pl. 4, 1794.

[4] Flora Peruv. & Chilen. **2**: 17, pl. 123 f. b, 1799.

[5] Systema veg. **1**: 625, 1825.

None of the typical Gilias are native to the eastern United States, but at least five have been reported as escapes; these all have corollas of a more or less funnelform shape and violet or lavender color, but differ in the respects listed:

Gilia achilleifolia Benth. with deep violet broad-petalled flowers in few-flowered heads, around New York City.

G. capitata Dougl. ex Hook., with lavender narrow-petalled flowers, in many-flowered heads, around New York and in Highland County, Ohio.

G. inconspicua (Smith) Dougl. ex Hook. a small plant with most of its leaves basal and pale lavender flowers in lax corymbs, in Middlesex County, Mass.

G. multicaulis Benth., a much-branched plant with numerous purplish flowers grouped in a large cyme, in Cumberland County, Maine and Middlesex, Mass.

G. tricolor Benth., a spreading-branched plant with the corymbose-cymose flowers yellow in the center, dark purple-blotched in the throat, and pale lavender on the limb, in Essex County, Mass. The introduced material was recognized by Greenman[1] as representing a variety, which he named *longipedicellata;* its nativity was at the time unknown, but it was subsequently found in California.

NAVARRETIA RUIZ AND PAVON

Like the next-preceding genus, this one was proposed[2] in 1794 and a species native to Chile and Argentina, *Navarretia involucrata,* was described[3] in 1799; a number of species were subsequently recognized in the western United States. In 1836 Endlicher[4] reduced its status to that of a section under *Gilia,* and has been followed by some authors, although others have maintained its generic distinctness. Kuntze[5] pointed out that the name has page priority over *Gilia,* and renamed many species usually assigned to the latter.

Two species have been reported as adventive in the east:

Navarretia intertexta (Benth.) Hook., with the calyx villous throughout and the violet corollas nearly tubiform, in Lee and Page counties, Iowa, and Allen County, Ohio.

Navarretia leucocephala Benth., in which the calyx is villous only intercostally and the corollas are whitish and funnelform, in Middlesex County, Massachusetts.

---

[1] Rhodora **6**: 154, 1904.

[2] Flora Peruv. & Chilen. Prodr. **1**: 20, 1794.

[3] Flora Peruv. & Chilen. **2**: 8, 1799.

[4] Genera plantarum: 657, 1836.

[5] Rev. Gen. Plant. (**1**): 432, 1891.

Program of Meetings during 1935

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Feb. 28	Recent Explorations in Cumberland County, New Jersey	Bayard Long	34
Mar. 28	The Maritime Element in the Flora of Salem County, N. J.	Dr. John M. Fogg, Jr	31
Apr. 25	Tidal Marsh Flora of east-central Delaware	Mrs. Kenneth D. Doak	25
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Dec. 19	Results of Recent Collecting Trips	Dr. Edgar T. Wherry	25

List of Officers and Members

John M. Fogg, Jr., *President*
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Robert R. Tatnall, *Secretary*
Arthur N. Leeds, *Treasurer*
Bayard Long, *Curator*

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Edwin B. Bartram, Bushkill, Pa.	1906
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Dr. Heber W. Youngken, Massachusetts College of Pharmacy, Boston, Mass.	1918

RECENTLY DECEASED MEMBERS

	Died
Joseph Crawford, Founder	Oct. 24, 1936
Charles C. Roberts, Active	Sept. 2, 1936

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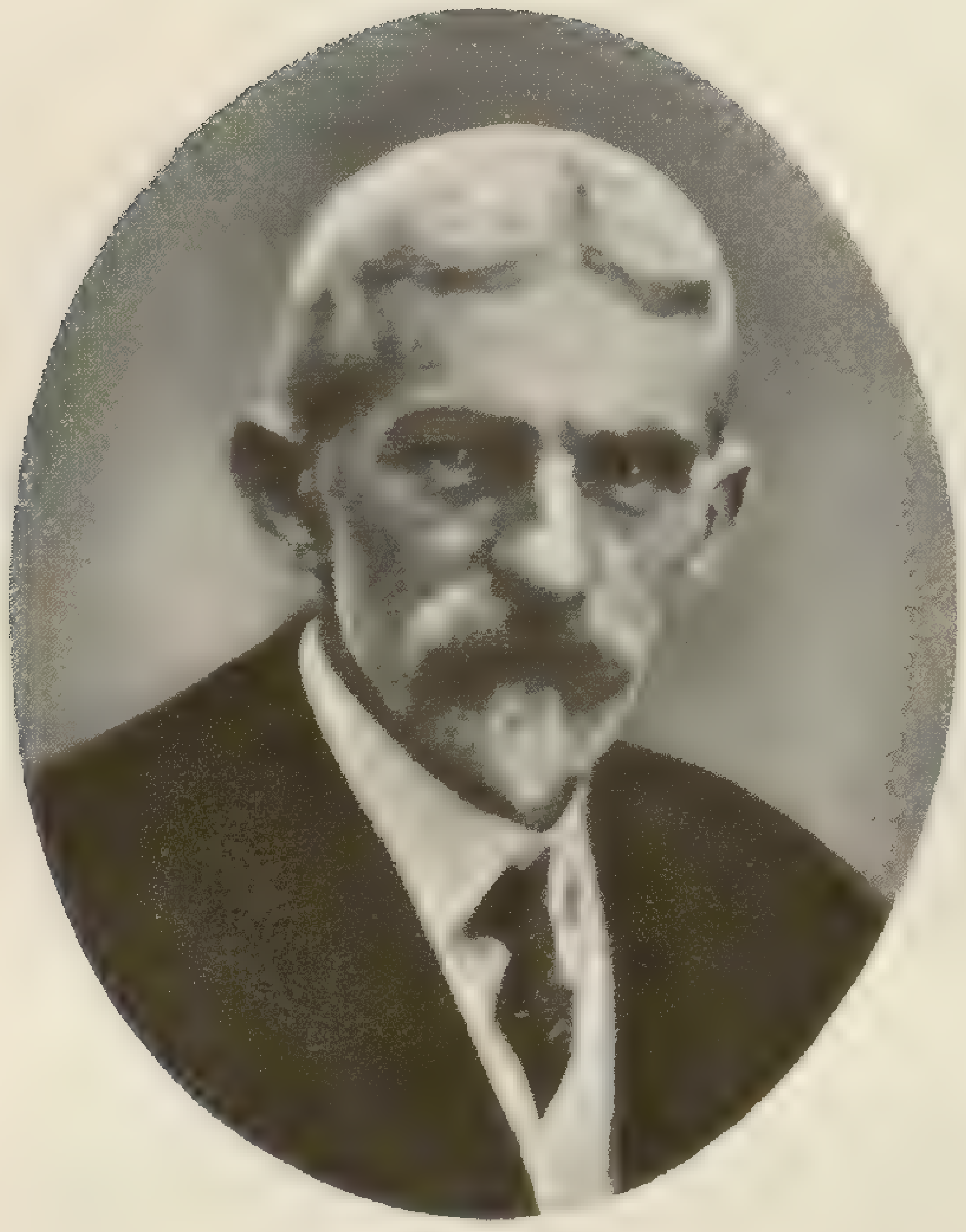

JOSEPH CRAWFORD

(1858–1936)

BARTONIA

PROCEEDINGS OF THE PHILADELPHIA BOTANICAL CLUB

No. 19 PHILADELPHIA, PA. 1937

A Supplementary Chapter on Franklinia alatamaha[1]

FRANCIS HARPER AND ARTHUR N. LEEDS

The area about Fort Barrington, McIntosh County, Georgia, has long been a botanical Mecca, owing to the discovery there of the Franklin tree (*Franklinia alatamaha* Marshall) on October 1, 1765, by John and William Bartram. In 1790 Moses Marshall found it still present (Darlington, 1849, p. 563), but all subsequent search for the tree in a wild state has proved fruitless.[2]

FLOWERING SEASON.

At the time of its discovery *Franklinia* was evidently not in bloom. ' It being then late in the autumn, we could form no opinion as to what class or tribe it belonged ' (Bartram, 1791, p. 468). In revisiting the spot about the last week of April, 1773, the younger Bartram ' took the road up the N. E. side of the Alatamaha ' from the vicinity of Darien. ' On drawing near the fort,' he writes (1791, p. 16), ' I was greatly delighted at the appearance of two new beautiful shrubs, in all their blooming graces.' One of these was *Franklinia;* the other, the fever tree or Georgia bark (*Pinckneya pubens* Michx.). The remark last quoted suggests that both species were in bloom at that time. (Why else would Bartram have been ' greatly delighted,' if not at his very first sight of the lovely blossom of *Franklinia*?) As to the flowering season of *Pinckneya*, we may say that its foliaceous pink sepals were conspicuously in evidence, though not fully developed, as early as April 30, 1933, when we observed them in Ware and Toombs Counties. *Pinckneya* continues blooming into June and July (Ravenel, 1882, p. 237; R. M. Harper, 1906, p. 156).

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[1] For helpful criticism and suggestions we are indebted to Dr. Roland M. Harper, Mr. Charles F. Jenkins, Dr. Francis W. Pennell, and Dr. Edgar T. Wherry.

[2] A few years ago a federal employee claimed to have rediscovered *Franklinia* near the Altamaha River in Long County. The news was spread abroad through the daily press at that time, and continues to crop up now and then, although no announcement has ever appeared in a scientific journal. At a later date the one reporting the rediscovery conducted a party of competent naturalists to the spot near Wildcat Spring, south of Ludowici, where the find was said to have been made. A search of several hours about this spot was entirely without result as far as *Franklinia* was concerned, but a number of trees of *Gordonia lasianthus*, the nearest relative of *Franklinia*, were noted. A specimen of the true *Franklinia*, secured in a horticultural garden at about the time of the original report, may have become confused with specimens of *Gordonia* collected near Wildcat Spring. One of the higher officials in the U. S. Department of Agriculture, after a careful investigation, concluded that the alleged rediscovery of *Franklinia* had no basis in fact.

Furthermore, Bartram says (1791, p. 467) of a still later visit: 'I employed myself during the spring and fore part of summer [of 1777], in revisiting the several districts in Georgia and the East borders of Florida, where I had noted the most curious subjects . . . . In the course of these excursions and researches, I had the opportunity of observing the new flowering shrub [*Franklinia*], resembling the Gordonia, in perfect bloom, as well as bearing ripe fruit.' This certainly indicates that it flowered no later than 'the fore part of summer.' Evidently *Franklinia* had in common with the related *Gordonia lasianthus* a much protracted flowering season.

The final testimony by Bartram himself on this subject was brought to light by Dr. Francis W. Pennell in the course of researches in London in 1930. He has kindly furnished us with the following transcript that he made of Bartram's own manuscript notes accompanying his specimen of *Franklinia* at the British Museum (Natural History):

'I. 1773.—Carolina, Florida & Georgia.
No. 1. Franklinia Alatamaha
Grows South Georgia lat. 32
Near the Sea coast. Fresh water Rivers

'This fine flowering Tree, was first observed growing wild near the River Alatamaha in Georgia, it grows erect, about 20 feet high its branches also assend upward. Its very large white fragrant flowers embelish'd with a large tassel or crown of golden Stamens are produced from the boosoms of the leaves towards their extremities of its branches in succession from April untill the autumn when it ceases flowering, whilst the seed of the flowers of the preceding Year are ripening.

'I have traveld by land from Pensylvania to the banks of the Missisipi, over almost all the Teritory in that distance between the Seashore & the first mountains, cross'd all the Rivers, and assended them from their capes a many miles, & search'd their various branches Yet never saw This beautiful Tree growing wild but in one spot on the Alatamaha about 30 miles from the Sea coast neither has any other person that I know of ever seen or heard of it. And what is very singular, it is so hardy as to stand in an open expos'd situation, in the Garden in Pensylvania without suffering the least injury from our most severe frosts, when very few Plants from that country will do in our Green houses.

Wm. B.'

The following additional manuscript notes seem to have been in a cover marked:

'Mr. Barclays Book [of specimens] Wm. Bartram'
1789.

The cover contains 38 specimens with good descriptive and geographical data. The ' Mr. Barclay ' was doubtless David Barclay, one of Dr. Fothergill's friends (*cf.* Fox, 1919, pp. 269–277).

> ' I collected these specimens amongst many hundred others about 20 years ago when on Botanical reserches in Carolina Georgia and Florida duplicates of which I sent to Doctor Fothergill; very few of which I find have enterd the Systema Vegetabilium, not even in the last Edition.
>
> ' The number of specimens that I sent were submited to the examination of Doctor Solander which by the returns I received from the Doctor (the nos. corresponding with those of my own duplicates) appear'd most of them to be either New Genera or Species; soon after Doctor Solander deceas'd & Doctor Fothergill soon after followed him. I have never learn'd what became of the specimens.
>
> ' These remaining with some more that I have kept by me to this time, which I cheerfully offer for the inspection & amusement of the curious, expecting or desiring no other gratuity than the bare mention of my being the discoverer, a reward due for traveling several thousand miles mostly amongst Indian Nations which is not only difficult but Dangerous, besides suffering sickness cold & hunger. But with a perfect Sence of gratitude I with pleasure acknowledge that the Noble Fothergill liberally supported me whilst in his employ with ample pecuniary assistance.
>
> Wm. Bartram
> Nov. 1788 '

Despite the records of Bartram himself as to a spring flowering season of *Franklinia* along the Altamaha in the eighteenth century, it appears that all of the specimens now in cultivation in the Northern States, and nearly all of those grown in Georgia, delay blooming till late July or early August. Mr. Charles F. Jenkins has published (1933, pp. 193, 202) some notes on the subject, and has kindly furnished us with corroborative information from Dr. C. C. Harrold, of Macon, Ga., and from nurserymen in Macon and Savannah. Finally, however, Mr. P. J. Hjort, of Thomasville, Ga., (*in litt.*, February 4, 1935) sends Mr. Jenkins the very interesting information that *Franklinia* blooms there during April and May, and irregularly at other times.

Another indication of a difference in the flowering season according to latitude is found in Michaux (1819, p. 298): ' The Franklinia blooms in Carolina about the beginning of July, and a month later near Philadelphia.'

The evidence thus accumulated from several sources leads us to believe that confidence in Bartram's original records is justified.

TYPE LOCALITY.

From John Bartram's manuscript journal (1765) and from his son's ' Travels ' (1791) it is fairly clear that *Franklinia* was discovered within 4 miles downstream from Fort Barrington, on the northeast side of the river. The herbarium notes in London (already quoted) are of interest in placing the type locality at ' about 30 miles from the Sea coast.' Fort Barrington is actually only about 23 miles in an air line from the coast, and the *Franklinia* locality was obviously somewhat nearer, since Bartram, traveling upriver in 1773, reached this spot before he came to the fort. In other cases, as well as this one, he was inclined to misjudge distances. If, however, the distance is to be measured by water rather than by air, then Fort Barrington is approximately 28 miles from the mouth of the Altamaha.[3]

Ravenel (1882, p. 237) reaches the following conclusion concerning the type locality:

> ' Now about two miles from the fort, and just at the commencement of the sandhills, the road passes between two pine land branches within 40 or 50 yards on either side, spreading out into flats which approach almost up to the road. Here was an abundance of Pinckneya on both sides, in fact the principal growth, and also the *only specimens seen from the road between Darien and the fort.* I suppose, at a rough estimate, there may have been " two or three acres covered with the tree," as Mr. Bartram states. . . . All the indications seem to point to the spot as the one where the Franklinia was discovered.'

This area may be readily located on the Everett City quadrangle, issued by the U. S. Geological Survey in 1918. At a point 1.6 miles northwest of Cox, on the south side of the road, appears the head of a branch swamp, at an elevation of slightly less than 20 feet above mean sea level. In all probability this is one of the ' two pine land branches ' mentioned by Ravenel. The other lies on the opposite side of the road, but is not indicated at all on the topographic map. Its head is located between the 20- and 30-foot contours, just east of the side road leading to Pinch's Hill.

On the other hand, Wherry (1928, pp. 174–175) arrives at a different conclusion concerning the type locality, after discovering another colony of *Pinckneya* along a trail cutting through the northwestern portion of Sandhill Bay, at a distance of about 1.6 miles northeast of the fort. He questions whether military considerations would have permitted a road to approach the fort from the direction of Ravenel's colony of *Pinckneya.* He also calls attention to the presence of a large patch of *Kalmiella hirsuta* adjacent to the latter colony, whereas he himself found the species absent near the northern colony. This state of affairs is considered significant by Wherry, for he points out that it was only after crossing to the south side of the Altamaha that Bartram remarked on encountering *Kalmiella* as a species new to him.

By a fortuitous circumstance, however, information has come to light concerning the location of roads in this vicinity in Bartram's day. While on our

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[3] *Cf.* Altamaha, Oconee and Ocmulgee Rivers, Ga., House Document No. 68, 74th Congress, 1st Session, pl. 1, 1935.

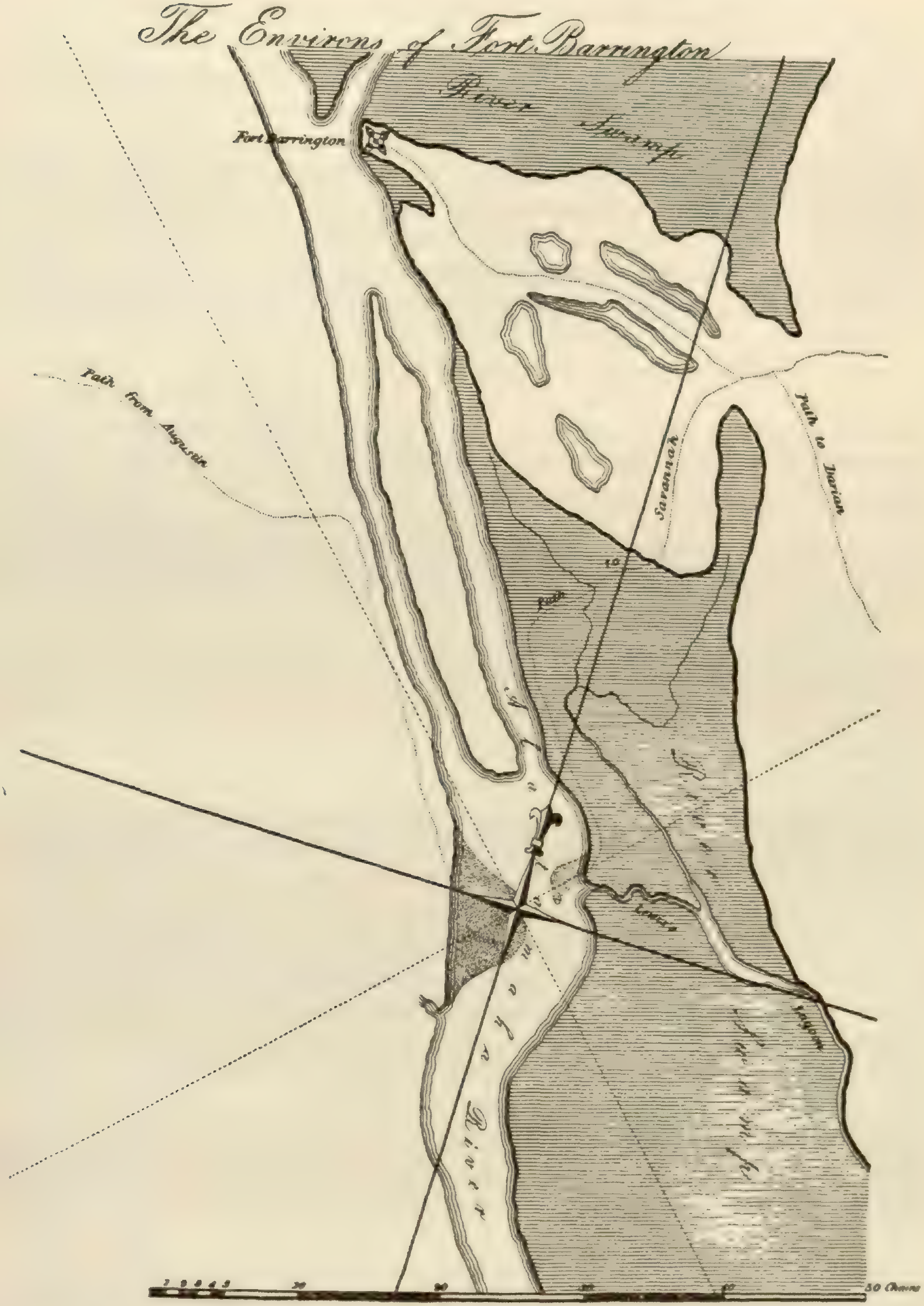
The Environs of Fort Barrington
River Swamp
Fort Barrington
Path from Augustin
Path to Darien
Savannah
Path
10
Alatamaha River
Lagoon
1 2 3 4 5 10 20 30 40 50 Chains

FIG. 1. Fort Barrington and vicinity, McIntosh County, Ga., in the period 1751–1771. (From De Brahm's History of the Province of Georgia, pl. [5], 1849.)

pilgrimage to Fort Barrington in April, 1933, we had the good fortune to become acquainted in Savannah with the late Mr. William Harden, Librarian of the Georgia Historical Society and nephew of Dr. J. M. B. Harden (1810–1848) of Liberty County, who in turn was a brother-in-law of John and Joseph Le Conte. When we mentioned the object of our quest near Fort Barrington, Mr. Harden produced a copy of De Brahm's 'History of the Province of Georgia' (1849), and called our attention to a map of 'the environs of Fort Barrington,' which appears as plate [5] in this work (reproduced—from the copy of De Brahm in the library of the American Philosophical Society—as fig. 1 of the present paper). The map is based on a survey made sometime between the years 1751 and 1771, and it shows a road, marked 'Path to Darian,' that is obviously identical with the present road leading from the fort toward Cox and Darien.

Additional evidence on this point is furnished by Dr. William Baldwin (in Darlington, 1843, p. 333), who more than once discussed botanical questions with William Bartram. On November 24, 1816, he wrote as follows from the Sand Hills near the Altamaha:

> 'Some of the swamps bordering upon the Alatahama[4] are ornamented with the *Pinckneya pubens,* of Michaux. . . . At present, I will only observe that it, also, was discovered by our venerable friend Bartram. He found it near Fort Barrington, on the Darien road, along with the *Gordonia Franklini.*'

As the most probable explanation of Bartram's failure to notice *Kalmiella* near the colony of *Franklinia,* we suggest that it was not yet in bloom when he arrived at Fort Barrington on his southward journey in 1773. In the Okefinokee Swamp region one of us (H.) has found the species in bloom as early as May 12, 1921, on Billy's Island, but not in bloom on May 9, 1930, at Suwannee Lake. In 1935 the first flowering at Suwannee Lake was reported on May 12 by Mrs. Rhoda Mizell Spaulding. In his calendar of species flowering at St. Mary's, Camden County, Ga., in 1813, Baldwin (in Darlington, 1843, p. 90) records this plant on May 17. Bartram's manuscript report (1775?, vol. 1, p. 10) to Dr. Fothergill fixes the time of his arrival at Fort Barrington at about the last week of April, 1773 — a date evidently too early for the blooming of *Kalmiella.* In any event, little room seems left for reasonable doubt that *Franklinia* was originally discovered in the area fixed upon by Ravenel.

Since it was customary for John Bartram to refer to novelties of plant life as 'curious,' the following excerpt from his journal of October 1, 1765, may be taken to refer to the discovery of *Franklinia* and *Pinckneya:* 'We mised our way & fell 4 mile below fort barrington where we lodged this night. this day we found several very curious shrubs one bearing beautiful good frute.' Thus he and his son evidently spent the night at or near the present site of Cox. In order to have passed the *Franklinia* locality, they must have proceeded along the road from Savannah as far as Pinch's Hill, or beyond, then missed their way by turning south along the road to Darien instead of continuing westward. Additional evidence of their route is found in another statement in the journal of October 1, which refers to 'some sand hills interspersed towards the river.' The only sand hills they could have encountered in 'this day's journey, of 20 miles,' were those bordering the river. On October 2, probably after being directed at their lodging place, they evidently retraced their route to the *Franklinia* locality, and then continued to the fort along the road shown on De Brahm's map. If this map is compared with the Everett City quadrangle, it will be seen that the road to Savannah probably led over the summit of Pinch's Hill rather than through the northwestern portion of Sandhill Bay.

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[4] Misspelling for Alatamaha, the form used in two other places on the same page.

In the haste of a brief visit we made on the afternoon of April 8, 1933, we passed without investigation the first of the two branches referred to by Ravenel, but paused at the head of the other on the north side of the road. This spot doubtless serves as an example of a 'sand-hill bog,' as defined and described by R. M. Harper (1906, pp. 90–93) in his phytogeographical sketch of the neighboring Altamaha Grit Region. In the bog we noted *Pinckneya* with old fruit (though the plant was apparently much less abundant than reported by Bartram and by Ravenel); and, in addition, *Pinus serotina, Magnolia virginiana, Cliftonia monophylla, Persea pubescens, Liriodendron tulipifera, Aronia* sp., *Pieris nitida, Smilax laurifolia*, and *Sphagnum*. Along the border between the bog and the sand hill were *Azalea viscosa, Leucothoë* sp., *Serenoa repens, Kalmiella hirsuta*, and *Styrax pulverulenta*.

If, perchance, the Bartrams originally found *Franklinia* at the head of only one, instead of both, of the branch swamps where *Pinckneya* still occurred in Ravenel's time, we consider the bog on the north side of the road as the spot in which it was the more likely to have been growing. We therefore regard this as the probable type locality, although means for a conclusive choice between the two branches may never be found.

On the inviting slopes and summits of the surrounding sand hills we found *Quercus geminata, Q. catesbaei, Pinus palustris* (longleaf pine), *Polycodium* sp., *Lupinus* sp., and *Aristida* (*stricta*?). Three-eighths of a mile farther west, at a cypress pond on the north side of the road, we noted *Glabraria geniculata* and *Cyrilla racemiflora*. Still farther along, at the head of a little tributary of the river swamp, about opposite the summit of Pinch's Hill, we found *Persea pubescens, Gordonia lasianthus, Ilex coriacea*, and *Myrica carolinensis*—the last with unusually large young leaves that for a few moments deluded us into the notion that we stood in the presence of *Franklinia*!

In a few more minutes we drove down a narrow tongue of the sand hills to the site of historic Fort Barrington and gazed on the wide, muddy waters of the Altamaha, where Bartram had been ferried over by a Creek Indian 160 years before. Some large oaks as well as cypresses, both draped with *Dendropogon*, stood in the edge of the river. The site of the fort was occupied by a house that served as quarters for a fishing club. Ditches and embankments marking the outlines of the old fort were still in evidence in 1881 (Ravenel, 1882, p. 236).

Ecological Distribution.

The whole history of *Franklinia* suggests that it had a very limited geographical range. Likewise its ecological range was, in all probability, very restricted. Hitherto there seems to have been very little discussion of the particular habitat or ecological niche it may have occupied, other than Ravenel's remark (1882, p. 236):

> ' On consulting Mr. Bartram's Travels and learning more of the topography of the country I became convinced that it was not in the river swamp, it was to be looked for but in the flats and pine land branches.'

We agree entirely with Ravenel that *Franklinia* was not a river-swamp species. The area near Fort Barrington where *Pinckneya* now occurs is not part of the river swamp; the habitat of the latter plant is recorded as ' branch-swamps and sand-hill streams ' (R. M. Harper, 1906, p. 156). Furthermore, most of the trees and shrubs of the river swamps of southern Georgia differ from *Franklinia* in having a fairly wide distribution. The nearest relative of *Franklinia, Gordonia lasianthus*, is not a river-swamp species. In the Altamaha Grit Region it is ' strictly confined to non-alluvial branch- and creek-swamps ' (*op. cit.*, p. 201); and in Okefinokee Swamp it occurs in hammocks, cypress bays, sphagnous bogs, and prairie ' heads ' (F. Harper, 1927, pp. 220, 230, 236, 240), while outpost individuals may be seen encroaching on the prairies themselves.

We venture to suggest that the principal habitat of *Franklinia* was the ' sand-hill bogs,' *i. e.*, ' boggy places at the heads of the sand-hill branches ' (R. M. Harper, 1906, p. 90). It is very interesting to note that each of the plants listed on a preceding page from the bog near Fort Barrington is also recorded from sand-hill bogs of the Altamaha Grit Region (*op. cit.*, pp. 91–92).

The type of sand hills found in that region is almost confined to it. These sand hills border the swamps of nearly all the creeks and rivers of the region, and with few exceptions are located on the northeast side of the streams (*op. cit.*, p. 25). Those near Fort Barrington, though about 30 miles from the nearest part of the Altamaha Grit Region, evidently belong to the same type. They extend downstream from the fort for about 5 miles, but apparently no farther in that direction—a fact which would probably account for the absence of *Franklinia* still farther downstream toward Darien. On the Soil Survey map of McIntosh County (Fuller, Hendrickson, and Moon, 1932) the sand hills are represented as composed chiefly of Norfolk sand. We are not aware that any thorough or systematic search has been made for the species in these sand hills for any considerable distance upstream from Fort Barrington. They apparently extend, with some interruptions, as far as Beard's Creek, on the boundary between Long and Tatnall Counties.[5] Until the bogs in the entire extent of the Altamaha River sand hills have been explored, hope for the eventual rediscovery of *Franklinia* need not be abandoned. In fact, the search might logically be extended to the sand-hill bogs throughout the Altamaha Grit Region, which covers approximately 10,000 square miles in the Coastal Plain of Georgia.

Bartram may not have encountered any sand hills of this type in his Georgia travels except on the Altamaha and possibly on the Satilla. Apparently he saw nothing of the Altamaha Grit Region unless at its northeastern extremity in Screven County (R. M. Harper, 1906, p. 122). This might explain his failure to find *Franklinia* elsewhere than at the type locality.

Whether *Franklinia* was associated directly with *Pinckneya*, in the identical habitat, is a question on which more light would be welcome. Bartram's account, while not conclusive, is suggestive of such an association; and so are Baldwin's remarks, quoted on a preceding page. Perhaps one of the strongest bits of evidence is the fact that both species are acid-loving (Wherry, 1928, pp. 175–176). Dr. Wherry gives us the additional information that the river water is alkaline and neutralizes the soils of the swamp in times of overflow. Thus the general assumption as to the occurrence of the two species in the same ecological association is doubtless well founded.

The Long Search for Franklinia.

After 1790, when Moses Marshall encountered the species in the wild state for the last time on record, there is a lapse of nearly a century before we begin to hear of further search for *Franklinia.* Animals have a way of becoming extinct long years before the scientific world wakes up to the fact, and perhaps it is likewise with plants.

H. W. Ravenel, of Aiken, S. C., and a friend made, between them, five trips to the Fort Barrington area in search of *Franklinia,* in March, June, July, September, and November, 1881. He mentions (1882, p. 238) similar searches by a Mr. Cowper, of Darien, for several years prior to 1881, on both sides of the river. 'I also heard whilst there that a collector of seeds from some Northern house had come on from Florida to hunt for the Gordonia near Barrington, and that he was also unsuccessful.'

'From that time [Ravenel's] to the present it has been repeatedly sought by collectors from the Arnold Arboretum, the Biltmore Herbarium, the U. S. Department of Agriculture, and various nursery companies, without success' (Wherry, 1928, p. 174). Dr. Wherry himself has engaged in the quest on four different trips to the region.

Our own visit to Fort Barrington and vicinity on April 8, 1933, has already been mentioned. On March 22, 1936, one of us (H.) followed the Old Post Road from Burnt Fort on the Satilla River to Mt. Pleasant, 5 miles southwest of Fort

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[5] *Cf.* Altamaha, Oconee and Ocmulgee Rivers, Ga., House Document No. 68, 74th Congress, 1st Session, pl. 1, 1935.

Barrington.[6] This road lies along the crest of an escarpment marking the eastern boundary of the Penholoway Terrace (*cf.* Cooke, 1925, pp. 21, 24–26, pl. 10A), and was evidently traveled more than once by the Bartrams, father and son. On April 16, 1936, both of us covered this same route, besides following the north bank of the Satilla as closely as we could in an automobile from Owen's Ferry to Burnt Fort. Near the Satilla, between Bailey's Mills and Burnt Fort, we found two boggy areas at the heads of branches among the sand hills, but not even *Pinckneya* was in evidence there. Along the Old Post Road conditions were not especially promising. Just after crossing to the northeast side of the Little Satilla River swamp, at the point where Wayne, Camden, and Glynn Counties meet (Nahunta quadrangle), we found on the west of the road a sort of sand-hill bog, containing much *Gordonia lasianthus.* Two miles north of Little Buffalo Swamp, on the east of the road in Wayne County (Everett City quadrangle), is an extensive, level sphagnous bog with a dense growth of *Cliftonia monophylla.* Otherwise, bogs of the approximate type we were seeking scarcely seemed to come into view from the road.

On March 28, 1937, a party of eight naturalists from the Philadelphia region (including four Bartram descendants) undertook a brief reconnaissance in the Altamaha River sand hills west of Ludowici in Long County. High water in the river swamp and its tributaries restricted our movements, and in the time available our investigation was practically limited to the area about the Fountain Hole, a little more than 3 miles west of Ludowici. A sphagnous bog immediately south of the Fountain Hole, perhaps not more than 5 feet above the level of the main river swamp, yielded, among other things, *Pinckneya, Magnolia virginiana,* and *Saururus cernuus.* There were marks of previous flood waters of the Altamaha as high up as about 8 feet on the trees in this bog. If, perchance, floods were fatal to *Franklinia,* such a state of affairs would account for its absence in this bog, at least.

Illustrations of Franklinia.

What is probably the earliest drawing but one of *Franklinia* is apparently the latest one to be published (Jenkins, 1933, pl. facing p. 194). This is a water color made by William Bartram in 1788, and now reposing, along with several dozen other drawings by him, in the British Museum (Natural History). The finely delineated blossoms, leaves, and fruit attest Bartram's skill as an artist.

The Index Londonensis gives references to 21 published figures of *Franklinia:* 1 as *Franklinia alatama,* 1 as *Franklinia alatamaha,* 6 as *Gordonia altamaha,* and 13 as *Gordonia pubescens.* Beginning with Cavanilles (1788), these references include, among others, Michaux (1813, 1819), Rafinesque (1832), Audubon (1841), Sargent (1891, 1905), Lounsberry (1901), and Britton (1908). Rafinesque's drawing[7] shows an astounding and rather unaccountable similarity to Bartram's (which was not then published) in the disposition of the flower, leaves, fruit, and twig; this similarity even extends to two detached figures of the capsule. Had Rafinesque possibly seen in Philadelphia a duplicate of the Bartram drawing in London?

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[6] See Boulogne, Nahunta, Hortense, and Everett City quadrangles.

[7] Atlantic Journal, vol. 1, no. 2, p. 79, 1832.

Audubon's drawing is in his 'Birds of America.'[8] Here a blossoming spray of the plant serves as a perch for Bachman's Warbler, named *Sylvia bachmanii* in honor of Audubon's friend and collaborator, Dr. John Bachman. In his 'Ornithological Biography' (vol. 2, p. 483, 1834), Audubon refers to it as 'a figure of one of the most beautiful of our southern flowers, originally drawn by my friend's sister, Miss Martin.' He also remarks (p. 484): 'This beautiful tree, which grows in Georgia, seldom attains a height of more than fifteen feet.' The type locality of Bachman's Warbler was near Charleston, S. C., the home of Bachman and of Miss Martin[9] as well. This circumstance, together with Michaux's remark quoted on a previous page, indicates that *Franklinia* was growing in cultivation in Charleston during the early part of the past century, and perhaps even in the 1790's, when Michaux may have seen it there in his father's botanical garden.

A figure probably not generally found in scientific libraries is described by Jenkins (1933, p. 194): 'This past summer an enthusiastic amateur horticulturist [footnote: Dr. C. C. Harrold of Macon] in Georgia has issued a placard with a colored illustration of the bloom and leaves, which he has scattered among boy scouts, farmers, hunters and woodsmen, hoping that, for a suitable reward, they may come across a living wild plant.' One of these colored plates is in the library of the Historical Society of Pennsylvania.

Possible Causes of Extinction.

There have been various speculations as to the cause of the apparent extinction of *Franklinia* in a wild state (*cf.* Wherry, 1928, p. 175; Jenkins, 1933, p. 207; R. M. Harper, 1935, p. 13). The last writes:

> 'The species must have been on the verge of extinction when the Bartrams discovered it . . . . Whether some of their contemporaries who visited the place soon afterward took the last specimens, or they were wiped out by the "Yazoo freshet" of 1796, or the "cold Saturday" of February, 1835, or some other natural cause, we may never know.'

Fires were common in this general region even in the Bartrams' day, and although one would hardly expect them to have much effect on such a moist habitat as the bogs, yet Dr. Wherry informs us that some of the local bog plants, including *Pinckneya*, did burn to the ground in a very dry year.

Since *Franklinia* has proved so hardy in cultivation in the Northern States, the wild stock in Georgia is scarcely likely to have been seriously affected by the severest local freezes.

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[8] Folio ed., vol. 2, pl. 185, 1833; octavo ed., vol. 2, pl. 108, 1841.

[9] Miss Maria Martin, Bachman's sister-in-law. In 1832-33 Bachman's household included, in addition to himself and his wife with their nine children, his own mother, his wife's mother, and his wife's gifted sister Maria. Writing from Charleston on November 11, 1832, to Audubon in Boston, Bachman mentions *Franklinia* among a number of plants 'Maria has figured for you.' (Bachman, 1888.)

If *Franklinia* were a river-swamp species, there would be ample chance for it to be submerged by floods, which may have become more severe in the era of settlement and land-clearing than they were in previous times. But the heads of the two branches, in one or both of which *Franklinia* was presumably discovered, seem to have an elevation of about 18 and 25 feet, respectively, above mean sea level, whereas the neighboring village of Cox and many houses within a radius of a couple of miles have an elevation of only 9 to 17 feet. Now the elevation of the river's surface at the Seaboard Air Line Railway bridge, about 2 miles below the *Franklinia* locality, is 2.3 feet above mean sea level.[10] Therefore the maximum recorded flood rise at this point of about 14 feet (*op. cit.*, p. 32) would scarcely have inundated the head of either branch, and especially not the one which we regard as the probable type locality.

While no exact statistics are available concerning the 'Yazoo freshet' of 1796 (*cf.* R. M. Harper, 1930, p. 76) on the Savannah and Altamaha Rivers, there is a tradition, according to Mr. Hue Thomas, Jr., of the U. S. Engineer's Office in Savannah, that this flood was higher than any of the recent ones. Mr. Thomas also states that the 1936 flood was 0.3 foot lower than the 1929 flood at the Seaboard Air Line bridge over the Altamaha, and 1.3 feet lower than the 1925 flood, which was the highest in 43 years. On April 29, 1936, one of us (L.) found that most of the road between Townsend and Cox, in McIntosh County, had been inundated by the flood about ten days previously. A portion of the road between Cox and Fort Barrington was still under water. A resident of Cox thought that Sandhill Bay (where Wherry had found *Pinckneya*) had probably been under 2 or 3 feet of water.

The possibility of salt tides backing up the river for a distance of over 20 miles from its mouth and overflowing its banks to a height of more than 20 feet (*cf.* Jenkins, 1933, p. 207) seems very remote indeed.

It is well known that Moses Marshall was the last collector to find *Franklinia* in the wild state; this was in 1790 (*cf.* Darlington, 1849, p. 563). It is not so well known that in 1787 and 1789 the London firm of Grimwood, Hudson, and Barrit was ordering considerable quantities of *Franklinia* from Humphry Marshall, of Pennsylvania, who was conducting a nursery business in partnership with his nephew Moses.[11] Thus a letter of February 6, 1787, inquires concerning prices on certain 'bedded out' plants, including 100 or more of *Franklinia.* A letter of August 7, 1787, asks Marshall to send 'as many as you can of Franklinia,' while a letter of June 3, 1789, orders '10 Franklinia' and 20 'Gordonia pubescens' [the latter a synonym of *Franklinia*]. An attempt to fill orders such as these from the limited stand of trees at the type locality may well have had a serious, or possibly even fatal, effect upon it.

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[10] Altamaha, Oconee and Ocmulgee Rivers, Ga., House Document No. 68, 74th Congress, 1st Session, p. 22, table 1, 1935.

[11] See two volumes of Humphry Marshall's correspondence in the Manuscript Division of the Historical Society of Pennsylvania.

After all, however, the disappearance of *Franklinia* in a wild state is a mystery still awaiting solution.

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Notes on a Study of the Southeastern Azaleas with Description of two New Species

W. P. Lemmon

An investigation, begun some four years ago to determine if there was any relation between the color of winter-buds and of flowers in *Azalea*, has developed into a study of all the species of this genus in the eastern United States, making use of data obtained from living plants identified by tags. This study will not be completed for several years, but notes on what has already been accomplished will be of interest.

The area, in which field-work has been done to date, covers the counties of Cobb, Cherokee, Fulton, Dawson, Lumpkin and Union in northern Georgia, the Nantahala National Forest and the Great Smoky Mountains National Park, all physiographically representing the Inner Piedmont and Blue Ridge regions. The previously described species occurring therein and included in the study are *Azalea calendulacea, A. speciosa, A. arborescens, A. canescens, A. alabamensis,* and *A. nudiflora.* Also noted, but not yet determined, are several well defined plants of different colored corollas, but with *lemon*-yellow blotch on the upper lobe, instead of the orange-yellow characteristic of both *A. speciosa* and *A. calendulacea* — a feature probably due to a lemon-yellow ancestor, plants bearing corollas of that color being occasionally noted. Determination of the status of these plants will require further study.

Study of living plants has revealed that, in all the species observed, mature leaves on *young* growth wood show more or less fastigiation, while mature leaves on *old* wood vary in different species from flat-spreading in *A. calendulacea* to fastigiate in the new species, *A. fastigifolia.* Also there is a definite transition from leaves to winter-bud scales. This transition has been found to exist on the *young,* but not on the *old* growth. On young growth the terminal twig often shows leaves reduced to bracts, the bracts in turn being reduced and of filiform shape with scale-like bases that appear at the base of the bud, above which come the bud-scales with apical awns; the sequence clearly shows the stages of transformation. But only on the *old* growth does there seem to be a definite relation between fastigiation and leaf-transformation. There it ranges from the flat-spreading-leaved *A. calendulacea,* with bud-scales mucronate or merely acute, to the fastigiate-leaved *A. fastigifolia* with *all bud-scales* awned, those of the outermost scales often half the length of the bud. A great deal of additional field-study will be required to definitely establish this characteristic as generic, but, if established and supported by such other items as the number of winter-bud scales, a re-grouping of Azaleas would be possible. It is proposed to extend the field-work during the next three years to cover all of our eastern species, making studies of some 500 individual plants.

In 1934 the species, mentioned above as *Azalea fastigifolia*, was noted in the Piedmont section of Georgia at an elevation of about 1300 feet, one colony being on the estate of Mr. W. C. Wardlaw, in Fulton County, others west of Sweatt's Mountain in Cobb County. The color of the corolla is a rich scarlet, tinged with orange, but with no blotch on the upper lobe. From *A. speciosa* the new species is definitely distinct in the winter bud, in the absence of the blotch on the upper corolla-lobe and in the channeling of the mucronaceous corolla-lobes; and from all described species it differs in the fastigiate, stiff, thick leaves. Owing to the nature of the leaf-growth the new species may be known as **AZALEA FASTIGIFOLIA** Lemmon, spec. nov. to be described as follows:

Shrub up to 1.5 m. tall, branching mainly at summit. Twigs, when young, light green, with stiff appressed hairs, eglandular; at maturity, reddish-gray. Winter bud with 15 or fewer scales (counted to first flower-bud), light reddish-brown, all exterior scales ciliate, and with apical awns, those of the outermost scales often half the length of the bud. Leaves, when flowering, of a general oblanceolate type (some nearly spatulate), acuminate, never obovate; above glabrous, midrib pubescent with short hairs, margin short-ciliate, tip-gland pinkish; beneath, midrib puberulent and midrib and veins strigose, otherwise glabrous. Leaves at maturity (Sept. 6, 1936) thick and stiff, elliptic, narrowly to broadly so, the spatulate appearance of the young leaves having practically disappeared, acuminate, 1–3 (–4.5) cm. long, 5–9 mm. wide; those on the flowering branches numerous and fastigiate, on non-flowering twigs fewer (5–7); above dark green, glabrous, edges ciliate, midrib pubescent; beneath lighter, glabrous, midrib much lighter in color than blade, it (and sometimes also other veins) pubescent and with few short, appressed hairs. Pedicels light green, pubescent, eglandular. Calyx-lobes unequal, 0.75–1.25 mm. long, the 2 posterior deltoid, the 3 anterior semi-orbicular, with few short hairs and ciliate tips. Corolla-tube ridged, the ridges extending to tips of lobes, forming a pronounced interior channel; entire exterior of corolla papillate (or glandular), the tube- and lobe-ridges hirsute, an occasional hair gland-tipped; limb oblique, gradually expanding, tube approximately 2 cm. long, lobes 18–21 mm. long, upper 10–12 mm. wide, the remainder 6–8 mm. wide, margins not crispate to slightly so; upper lobe-tip obtuse, the 2 lower sharply recurved; laterals with channel extending into acute mucronaceous tips; lobe-tips often ciliate; interior of corolla-tube hirsute: internally dark scarlet, upper lobe tinged with orange, other lobes with orange on the mucronaceous tips; externally, tube dark scarlet, limb pinkish-salmon, the lobe-midribs orange-tinged extending through to the tips: non-fragrant. Stamens: filaments pinkish-orange, lower half heavily pubescent, upper glabrous; anthers straw-yellow. Style scarlet, ascending, heavily pubescent on lower half, upper with scattered hairs; stigma green; ovary densely pubescent with long, silky hairs, the mature capsule not seen.

(Frutex, 1–1.5 m. altus, superne ramosus; alabastri squamae ciliatae aristatae; folia ad anthesim juvenilia oblanceolata acuminata, matura elliptica 1–3 (–4.5) cm. longa, supra glabra ciliata, subtus venis parce pubescentia, ramorum florentium foliis multis fastigiatisque; calycis segmenta inaequalia 0.7–1.3 mm. longa apicibus ciliata; corollae tubus sulcatus coccineus 20 mm. longus et lobi 18–21 mm. longi superioribus 10–12 mm. latis potius aurantiacis et anterioribus 6–8 mm. latis apicibus aurantiacis; staminum filamenta pilosa distaliter glabra; stylus proxime dense, distaliter parce pilosus.)

Type in Herb. Academy of Natural Sciences of Philadelphia, collected in flower by W. P. Lemmon, May 4, 1936 on farm of L. L. Danger, ½ mile east of

Blackwell School house, Cobb Co., Georgia. Winter-buds and color sketches of bud and flower also in the Academy's herbarium.

Physiographic province, Piedmont Georgia.

Statements of the mountain people of the Georgia Blue Ridge country to the effect that "Thar's two kinds of yeller honeysuckle" prompted Mr. J. A. McKay to investigate in 1931. In connection with his nursery work near Neel Gap, Mr. McKay had an excellent opportunity to study the problem, and after three years became convinced that the mountain people were right and that a new species of yellow *Azalea* existed. In 1934 McKay asked the writer to check his findings; this has been done, and I confirm Mr. McKay's judgment.

Of the recognized species of *Azalea* only *A. calendulacea, A. nudiflora, A. arborescens, A. prinophylla* (*A. rosea*) and possibly *A. viscosa montana* appear to occur in the southern mountains above the 3000 foot elevation. Of these species only *A. calendulacea* has yellow corollas, all of the others being either pink or white. It would therefore appear that, as *A. calendulacea* normally blooms while leafing, a yellow-flowered species occurring only above 3000 feet, growing contiguously with *calendulacea,* and blooming normally as long after leafing as August, could not be the species accepted as *A. calendulacea.* Assuming that a possibility exists that it may be a subspecies of *A. calendulacea,* resemblance is noted in the general color of the flower, the general shape of the leaves (although the new species has more elliptic leaves), the glandular-pubescent corolla-tube, and the gradually expanding limb. From *A. calendulacea* and also *A. speciosa* the new species is definitely distinct in the semi-fastigiate mature leaves, in not having a distinct blotch on the upper corolla-lobe, in the entire corolla being viscid in bloom, in the late blooming period, in the winter bud with its 15 or fewer scales, and in its restricted range. In honor of Dr. W. F. Baker, professor of botany at Emory University, the new species may be known as **AZALEA BAKERI** Lemmon & McKay, spec. nov., and defined as follows:

Shrub, 1–3 m. tall, with irregularly whorled branches, or tree-like. Young twigs light green, puberulent and sparingly strigose. Winter buds conical, 8–11 mm. long, yellowish; scales 15 or less, glabrous, ciliate, their tips mucronate or the lower prolonged into awns. Leaves elliptic in type, varying from narrowly to broadly so, usually acute and prominently gland-tipped; blades 2–8 cm. long, 0.5–3.25 cm. wide, thin, edges ciliate; above dark green and glabrous to light green and pubescent, the midrib always more or less strigose; beneath much lighter, glabrous, often shiny, or pubescent, the midrib always pubescent and strigose, veins strigillose; petioles 2–5 mm. long, pubescent. Flowers expanding from June 1st to August, after the leaves unfold, in usually 3–5 (7–9) flowered clusters, non-fragrant; bud-scales persisting. Pedicels 2–6 mm. long, viscid, villose. Calyx-lobes of unequal length, elliptic-acuminate to deltoid-ovate, setose, ciliate. Corolla-tube 18–23 mm. long, strongly ridged, viscid, externally glandular-pubescent, internally pubescent; limb gradually expanding; lobes: upper ovate, lateral and lower elliptic, acute; all glandular-pubescent along midrib posteriorly; upper lobe 18–21 mm. long, 15–22 mm. wide; laterals 18–21 mm. long, 6–15 mm. wide; lower 21–25 mm. long, 10–15 mm. wide; corolla, from chrome-yellow tinged with orange-red to deep scarlet-orange tinged with ochraceous, the posterior midrib section in the darker flowers much lighter than the anterior section, the upper lobe usually of a much lighter shade, but not prominently blotched. Stamens: filaments more than twice as long as the corolla-tube, ascending, the exserted portion carmine and glabrous, that within the tube lighter and pubescent; anthers about 2 mm. long, ochraceous. Style carmine, its base pubescent. Capsule about 15 mm. long, strigose with appressed, gland-tipped hairs.

(Frutex, 1–3 m. altus multiramosus; alabastri squamae ciliatae mucronatae vel inferiores aristatae; folia ad anthesim matura elliptica 2–8 cm. longa, supra glabra ciliata, subtus glabra (nitida) vel pubescentia; calycis segmenta inaequalia setosa ciliata; corollae tubus sulcatus fulvus usque ad ochraceo-coccineus 18–23 mm. longus et lobi 18–21 mm. longi superioribus 15–22 mm. latis pallidioribus; staminum filamenta pubescentia distaliter glabra; stylus basin pubescens.)

Type, Vogel State Park, Union County, Georgia, elev. 3119 feet, collected in flower by W. P. Lemmon, June 6, 1936. In Herb. Academy of Natural Sciences of Philadelphia.

Physiographic province, Blue Ridge Mountains of Georgia and North Carolina, at elevations above 3000 feet.

Note.—The flowering branches in this species are inclined to be flat-spreading and profusely flowering. The flowers are normally larger than *A. calendulacea,* often measuring 5–6 cm. wide. As the flower-buds expand, the lighter color of the posterior side of the midribs is prominent, particularly in the light color-form. During the study of this species a number of plants were found in the light color-form bearing flowers with 5–6 or 7 corolla-lobes and an equal number of stamens, but with only 5 calyx-lobes. The leaves of these specimens were inclined more to the obovate type. Specimens are in the herbarium of the Academy, together with winter buds and color sketches.

Another New Gentian from Georgia

W. P. Lemmon

A recent trip to the Savannah River section to locate topotypes of Michaux's *Azalea calendulacea*, has resulted in the collection of a new species of gentian with separate anthers. Of the known species of this type only two, *Gentiana affinis* Griseb. and *G. puberula* Michx., are known to occur in the eastern United States. Of these *G. affinis* is reported as occurring north of Kentucky and Kansas, leaving *G. puberula* as the only one in the southeast. The new species has a greenish corolla and differs from *G. affinis* in the leaves being oblanceolate to elliptic and with smooth margins, calyx-lobes equal and as long as corolla-tube or nearly so, corolla-lobes greenish- or purplish-white with darker green veining, the plaits practically entire, acuminate, pale lilac, with one side of the tip of each adnate to a corolla-lobe. From *G. puberula* the new species differs in shape of leaves, glabrous stem, shape and length of calyx-lobes, color of the corolla and in the plaits. Three specimens have been collected, all from Georgia: one in dry acid soil near Clyo, Effingham Co.; two from the vicinity of Statesboro, Bulloch Co., of which one was on the property of R. J. H. DeLoach, in moist acid soil. In honor of Mr. DeLoach, the new species may be known as **DASYSTEPHANA DELOACHII** Lemmon, spec. nov., and described as follows:

Plant 1–1.5 dm. tall. Stems several, ascending, glabrous. Leaves numerous, opposite, sessile, varying from obovate or oblanceolate in the lower, to acuminate-elliptic in the upper, 2.5–7 cm. long, smooth-margined, glabrous. Flowers from solitary to 7-clustered, sessile. Calyx-tube about 1 cm. long; lobes linear-lanceolate, approximating in length the corolla-tube, entire, glabrous. Corolla-tube 3–3.5 cm. long; lobes ovate-acuminate to triangular, erect or converging, 1 cm. long; plaits less than half length of corolla-lobes, acuminate, entire except for slight eroseness at extreme tip, each on one side adnate to the corolla-lobe 3/4 its length, on the other free; corolla greenish-white or greenish-purple with darker green veinings, the plaits pale lilac. Anthers separate. Capsule stipitate, flattened, 2.75 cm. long, 1 cm. wide. Seeds winged.

(Herba 1–1.5 dm. alta; caules plures glabri; folia multa sessilia glabra inferne obovata oblanceolatave, superne acuminato-elliptica; calycis tubus 10 mm. longus lobis lineari-lanceolatis integris glabris; corollae viridescentis tubus 30–35 mm. longus et lobi ovato-acuminati triangularesve 10 mm. longi, plicis minoribus acuminatis pallide lilacinis; capsula 27 mm. longa; semina alata.)

Type collected in flower by W. P. Lemmon, Oct. 23, 1936 near Clyo, Effingham Co., Georgia; in Herb. Academy of Natural Sciences of Philadelphia.

Physiographic province, Effingham, Bulloch and adjoining counties on the Coastal Plain of Georgia.

"Commelina communis" in the Eastern United States

FRANCIS W. PENNELL

It was in September, 1912, that Mr. Edward G. Vanatta, assistant curator of the conchological department of the Academy of Natural Sciences, while gathering plants as well as mollusks along the Hudson River near Peekskill, New York, noticed how intensely blue were the two colored petals of the day-flower there as compared with the pale-petaled plant abundant around Philadelphia. Also he noticed that the lobed sterile anthers had maroon or madder-brown centers, instead of being wholly yellow. He brought seeds of his dark day-flower to Philadelphia, and scattered them over the Academy's yard; there, and more especially on the yard of the adjoining building on Race Street, the plant has continued to flourish ever since.

Vanatta's discovery quickly had the keen interest of Mr. Bayard Long, who has observed both plants carefully for many years. He noted the greater hairiness of the Hudson River plant, and its strong tendency to have purple stems and leaves. As noticed also by Vanatta, it commences to flower about two weeks earlier. Mr. Long soon became convinced that two distinct species have been passing as *Commelina communis*, but which had the right to the name and what was the other?

In working over my southern collections of 1912 and 1913 I too became interested in *Commelina*, and in 1916 presented an account of the species occurring in the United States.[1] That study was developed at the New York Botanical Garden, and I did not suspect the existence of two entities in what I called *Commelina communis*. In quick succession there appeared in the National Geographic Magazine [2] and in Addisonia [3] paintings of *Commelina communis* from the gifted brush of Miss Mary E. Eaton, the material for these coming from the same colony along 200th Street, New York City, on the hillside west of the Botanical Garden, a colony that both the artist and I passed daily. It was on a visit to the Philadelphia Academy that Mr. Vanatta called my attention to his observations and to the fact that Addisonia had depicted his Hudson River plant. Since then I have also given thought to the problem. At first I was skeptical as to there being involved more than two color-forms, for the distinctions then known were almost wholly those of color and scarcely to be compared with the profound distinctions separating others of our species. But with long observation of the constancy of the color-distinctions of petals and anthers, and with the discovery of several more correlated characters, I also have become well convinced of the specific difference of the two.

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[1] Bull. Torrey Bot. Club 43: 93-111.

[2] 27: 492. 1915.

[3] 1: pl. 20. 1916.

Study of fresh flowers shows that the plant abundant in gardens and damp places near Philadelphia has larger petals, which in Ridgway's terminology[4] are "pale to light violet-blue", the lobed sterile anthers are wholly yellow, the anterior sepals are shallowly concave and united less than half their length, the posterior (remote) pedicel of each inflorescence is usually extended a considerable distance above the spathe and is floriferous, the spathe is acuminate-tipped (when opened) and is about as wide as long, and the leaf-sheathes are relatively slightly ciliate. The extended and floriferous posterior pedicel results in the first flowers which open from each spathe being placed one above the other, a characteristic habit of this species. Finally, as already stated, the flowering season at Philadelphia does not commence until mid- or late-July.

In contrast Vanatta's New York plant has shorter and more rounded petals which in Ridgway's terminology are "phenyl blue", the lobed sterile anthers are yellow with madder-brown centers, the anterior sepals are deeply concave and united over half their length, the posterior (remote) pedicel of each inflorescence is more slender, extends less conspicuously beyond the spathe, and usually is not floriferous,[5] the spathe is acute or slightly acuminate and (when opened) is somewhat wider than long, and the leaf-sheathes are ciliate with longer hairs. As already stated, at Philadelphia this plant commences to flower in June.

Which of these species is *Commelina communis* L.? When in England in 1930 I had some hope of deciding this question by consulting the Linnean Herbarium at London, and also seeing the other collections which were studied by Linnaeus. At that time I knew only the color and the pubescence distinctions, and so returned home with the feeling that it would be all but impossible to decide the identity of the old herbarium specimens. But with the recent discovery of the difference in the development of the posterior pedicel, there has at last appeared a valid character which can be correlated with pubescence in studying exsiccatae. So two years ago I passed the problem on to Dr. Harold N. Moldenke, of the New York Botanical Garden, who was then on a tour of botanical study in Europe. Dr. Moldenke has carefully analyzed each element back of the original diagnosis, and has supplied me with photographs of the specimens involved. In order that it may come to the attention of botanists in Asia as well as in this country this information and further discussion of the synonymy of both species are to be presented in the Academy's Proceedings rather than in BARTONIA.

The evidence seems to show that we can consider as *Commelina communis* L. the pale-flowered species abundant near Philadelphia. What name to give the dark-flowered plant, or whether the two are truly distinct specifically in their native territory of eastern Asia, are more difficult problems. Material from the United States National Herbarium, the New York Botanical Garden, Harvard

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[4] Color Standards and Color Nomenclature. Washington. 1912.

[5] Flower-bearing in my number 10748 from Ardsley, Westchester Co., New York, but the flower lacking pistil. Usually this is present in the corresponding flowers of *C. communis*, although sometimes lacking there also.

University and our Academy shows a puzzling complex of races there. Among these the dark-flowered plant is that characteristic of Japan and much of China and for it I use (at least temporarily) the name of *C. communis ludens* (Miq.) Clarke, based on *C. ludens* Miq. from Kwangtung, southern China. True *C. communis,* with its pale petals and glabrate growth, I have failed to find among these specimens, and therefore venture to suggest that it may be the progeny of an unusual strain which was imported from China to Europe over two centuries ago, and has had its characters well set through a century's subsequent growth in botanical gardens.

In the New World both these species are now well established as weeds in the eastern United States, but the arrival of neither is so early as the use of the name " communis " would suggest. Thus, in 1797 Abbot and Smith gave a colored plate of what they took to be *Commelina communis* in their " Natural History of the Lepidopterous Insects of Georgia ",[6] but the plant shown is clearly *C. erecta* L.[7] All our early genuine Philadelphia records concern *Commelina communis,* the early history of which is fortunately told us by William Darlington.[8] Writing from West Chester in 1853 he says: " It was accidentally introduced to this Borough, about thirty years since, from the Garden of the late John Jackson, of London Grove." One suspects that Jackson would have had it from Bartram's Garden, near which along the banks of the Schuylkill River the earliest dated specimen at the Academy was gathered; and, whether through this intermediate step or not, it seems evident that the plant was imported from European gardens as a botanical curiosity. It has since spread throughout eastern Pennsylvania, southern New Jersey, Delaware, and adjacent Maryland, its range (as represented in our herbarium) being now practically that of the Philadelphia local area, with the additions to the southward of Sussex County, Delaware, and Kent County, Maryland.

In contrast to this *Commelina communis ludens* is a later introduction to our country, one that only arrived toward the close of the last century. If it came directly from Japan, its late arrival accords well with the fact that commerce with that country was a development of the last quarter of the century. The earliest collection in our herbarium is that from Sellersville, Bucks County, Pennsylvania, made by C. D. Fretz in 1898. While still only an occasional plant with us locally, this species has become much the more widely spread over eastern North America. The Academy's herbarium shows it as now occurring from Connecticut to Iowa, North Carolina and Arkansas.

While confessedly incomplete because based so largely on representation in only a single herbarium, the above sketch gives a contrasted picture that will likely be confirmed in essential features by study elsewhere. There is doubtless much to be added, for botanists are notoriously careless about the collecting of weeds. As a summary of this discussion I append a key showing contrasted characters and recording the counties from which specimens are present in the Academy's herbarium.

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[6] Vol. 2, tab. 95.

[7] I would now consider that this species includes as narrow-leaved subspecies the southern *C. angustifolia* Michx. and the southwestern *C. crispa* Wooton.

[8] Flora Cestrica, ed. III, p. 334, as *" C. angustifolia?* Mx."

Lobed sterile anthers wholly yellow; petals with blade 10-15 mm. long, ovate-oval, pale to light violet-blue; anterior sepals shallowly concave, united less than half length; posterior flower of inflorescence well developed (although soon falling), exserted above spathe on a long stalk; spathe mostly 2-2.5 cm. long, acuminate, when opened about as wide as long, usually obscurely puberulent or glabrous; apex of leaf-sheath slightly or not ciliate; foliage pale; flowering near Philadelphia from mid-July to October. *C. communis typica*

Lobed sterile anthers yellow with madder-brown center; petals with blade 8-10 mm. long, widely ovate (as wide as or wider than long), intensely violet-blue (phenyl blue); anterior sepals deeply concave, united half length, less spreading; posterior flower of inflorescence not (or rarely) developed, although stalk persists as rudiment less conspicuously exserted from spathe; spathe 1.5-2 cm. long, when opened wider than long, more puberulent; apex of leaf-sheath usually pilose-ciliate; foliage darker green and stems more frequently purplish; flowering near Philadelphia from mid-June to October. *C. communis ludens*

1. **Commelina communis** Linnaeus

Horticulturally introduced; from China. Now an abundant garden weed near Philadelphia, but its range seemingly nearly confined to the Delaware valley. Specimens seen from Monmouth, Hunterdon, Ocean, Burlington, Camden, Gloucester, Salem, Cumberland and Cape May counties, New Jersey; Northampton, Lehigh, Berks, Bucks, Montgomery, Philadelphia, Delaware, Chester and Lancaster counties, Pennsylvania; Newcastle and Sussex counties, Delaware; and Cecil and Kent counties, Maryland.

2. **Commelina communis ludens** (Miquel) Clarke

Adventive from Japan and China. Now an occasional or locally common weed over much of the eastern United States. Specimens seen from Block Island, Rhode Island; New Haven county, Connecticut; Westchester county, New York; Monmouth, Hunterdon, Ocean and Burlington counties, New Jersey; Lehigh, Berks, Bucks and Philadelphia counties, Pennsylvania; Prince Georges county, Maryland; District of Columbia; Accomac, Norfolk and Warwick counties, Virginia; Wood county, West Virginia; Durham and Polk counties, North Carolina; Morgan county, Tennessee; Johnson county, Iowa; St. Louis county, Missouri; and from the Ozarks of Arkansas. Also seen from Japan and China.

The Flora of Seven Mile Beach, New Jersey

Flora S. Fender

Part I: General Discussion

INTRODUCTION

Seven Mile Beach is one of the coastal islands off the shore of Cape May County, New Jersey. It lies parallel to the coast in a NE–SW direction, and has accumulated the greatest land-mass on the northern end. No detailed study of the plants of the island has previously been made, either as such or in any work dealing with the flora of the entire state. The present survey was therefore undertaken with a twofold aim: (1) to compile a comprehensive list of the plants of the island, and (2) to compare the flora of Seven Mile Beach with that of southern New Jersey as a whole, laying particular stress on the coastal islands of Cape May County.

EARLY BOTANICAL WORK

In the earliest botanical surveys of New Jersey, Willis's " Catalogue of the Plants Growing without Cultivation in New Jersey " (2nd ed., 1877), and Britton's catalogue of the same area (1881), no coast island is mentioned except Atlantic City. Stone's " Plants of Southern New Jersey " (1910) includes 149 species of native plants from the island, based on specimens which are at present, almost in their entirety, in the herbarium of the Philadelphia Botanical Club.

RECENT BOTANICAL WORK

Since Stone's publication (7), occasional collecting on the island by W. M. Benner, R. R. Dreisbach, J. M. Fogg, Jr., C. Knopf, B. Long, F. W. Pennell, H. E. Stone, and a few others brought the number of species and varieties of plants, both native and introduced, to 255. Further collecting from April, 1935 to September, 1937, has increased this figure to 367. Those reported by Otway Brown, who has botanized on the island since 1899, bring the total number to 415. According to Mr. Brown's statement, the best stations have been destroyed, but he has unfortunately not kept specimens from them.

In connection with the present study, the herbaria of the Philadelphia Botanical Club and the University of Pennsylvania were inspected for plants from Seven Mile Beach, and, for comparison, from the other coastal islands of New Jersey. In the former herbarium, 253 species were represented from Seven Mile Beach. All but two or three of the additional collection of 111 species have also been deposited there. The University herbarium contained only 23 specimens from the island, which number has grown to 505, representing 277 species. These were obtained on collecting trips taken on an average of every two weeks during the growing season from early April, 1935, to June, 1936. Scattered trips have been taken since then. An attempt was made to cover all habitats at all seasons.

TOPOGRAPHY

There are three towns situated on Seven Mile Beach, Avalon and Peermont contiguous on the north end of the island, and Stone Harbor about a mile from its southern tip. Since the towns are not very large, much of the land even within their limits seems undisturbed. Between the two settlements are houses scattered along the connecting highway, but to the east is the very interesting region of the tall dunes. This region has apparently been little disturbed in the past four or five years, but was much cut when the now-abandoned railroad ran through. Directly below Stone Harbor is another patch of woods, but a great deal of the land behind the dunes to the southwest of the town is covered with brackish marsh.

HABITATS

BEACH: Gently sloping beach edges the island on the side toward the sea and up the bay shore at each end. In common with other sand beaches, scattered plants grow above the reach of the storm waves. These are chiefly *Cakile edentula* and *Xanthium echinatum, Arenaria peploides* var. *robusta,* an occasional *Euphorbia polygonifolia*, and *Salsola Kali* and *Atriplex arenaria* wherever the beach is low.

SALT MARSH: The land side of the island is edged with extensive salt marshes, characterized by *Spartina patens* and *Distichlis spicata*, with frequent patches of *Salicornia ambigua, S. herbacea,* and *S. mucronata.* The edge of the marsh is fringed with thickets of *Baccharis halimifolia* and *Iva frutescens* var. *oraria*, and near them grow less frequent but just as typical marsh plants, notably *Limonium carolinianum, Pluchea camphorata,* and *Aster tenuifolius. Spergularia leiosperma* and *Suaeda linearis* grow in more sandy places.

SALT MARSH ISLANDS: The wide marshes have many scattered islands. Two of these, Crab Island and an unnamed one to the north of it, have been explored. They are much like the well developed thickets of the mainland, consisting mainly of *Quercus stellata* and *Juniperus virginiana.* The latter is in such abundance that the islands are locally called " cedar ridges ".

SAND DUNES: The sand dunes are of two types, grass-bound and tree-bound. The former are those nearest the sea, and none has been observed more than 25 feet high, although the average is about 15 feet. The sand-binder is marram or beach grass (*Ammophila breviligulata*), but other characteristic dune species are: *Triplasis purpurea, Spartina patens, Panicum amarum, Euphorbia polygonifolia, Oenothera biennis,* and *Solidago sempervirens.* The dunes farther from the sea are most frequently formed around a clump of *Prunus serotina.* After the dune has been started by the cherries, there is sufficient protection for *Sassafras variifolium, Rhus Toxicodendron* (the bush form), *Vitis aestivalis, V. labrusca,* and

Psedera quinquefolia to become established. These, in turn, prevent the west wind, which is the prevailing one on this coast, from blowing back the sand. As a result, tree-bound dunes become as high as 45 feet. They are usually bound by *Ammophila* on the side facing the sea, except when they occur within the woods, where they are rarely very tall.

SAND DUNE HOLLOWS: These are of three types, open sand, grass-filled, and thicket-filled. In the first grow scattered plants of *Panicum Lindheimeri* var. *fasciculatum, Cenchrus pauciflorus, C. tribuloides, Juncus bufonius, Strophostyles helvola, S. umbellata, Euphorbia polygonifolia,* and *Polygonella articulata.* The second are thickly covered with *Ammophila breviligulata,* with scattered *Myrica carolinensis* and *Vitis aestivalis.* The bayberry forms the thickets of the third type. In them grow *Achillea Millefolium, Erechtites hieracifolia, Solanum nigrum* and *Phytolacca americana.* The central bushes of these thickets often die off from some undetermined cause, and in the protected spot thus formed grow *Achillea Millefolium, Erechtites hieracifolia, Aster lateriflorus,* and *Oenothera fruticosa.* They are the forerunners of the woods formation into which such a thicket ultimately grows. Of course, every intermediate form exists.

WOODS: Woods have developed behind the tall dunes. In fact, woods and dunes are interdependent, each affording the necessary protection for the other. Harshberger (4) observes that the dune finally destroys the woods, and it is true that one can observe a great deal of buried forest. However, the advance cannot be as swift as he implies, since then there would be a succession of very short-lived woods, and the present one, by tree-ring count, must be over 200 years old. The dominant trees are *Juniperus virginiana* var. *crebra, Quercus stellata* and *Q. falcata, Sassafras variifolium, Amelanchier oblongifolia, Prunus serotina,* and *Rhus copallina. Rhus Toxicodendron* is the most frequent underbush, and *Smilax rotundifolia* the most constant vine, sometimes making the woods absolutely impassable. The soil beneath these trees is often dry sand, when the woods are somewhat open, but just as often it is a rich, dark leaf-mold, made light in texture by the unusual percentage of sand.

Low places in the woods are most likely to support *Myrica carolinensis, Nyssa sylvatica, Vaccinium atrococcum, V. corymbosum,* and *Diospyros virginiana.* One large and well established swamp is dominated by *Acer rubrum* var. *tridens* and contains a clump of *Liquidambar Styraciflua.*

FRESH MARSHES: These occur at intervals along the edge of the woods and in various other dune-protected spots. They usually contain *Typha latifolia, T. angustifolia, Hibiscus Moscheutos, Sium suave,* and, occasionally, *Scirpus Eriophorum* or *Iris versicolor.* The more extensive ones are often merely wet, and are covered with a mixture of *Spartina patens* and *Panicum virgatum.*

Elements in the Flora—New Jersey

Undifferentiated Coastal Plain

The most prominent element in the flora of Seven Mile Beach is that of the region of southern New Jersey which is called here, for want of a better name, the Undifferentiated Coastal Plain. This name is used to distinguish it from specialized pine barren and maritime districts and to link it with the similar widespread formation of the Atlantic Coast of North America from New Jersey to Florida. This region includes the Middle District, Cape May District and Coast Strip of Dr. Stone (7). The combination of these undeniably similar districts has been made because the basis of Stone's division was the Piedmont element rather than the characteristically coastal plain plants, whereas the other two districts (Pine Barren and Maritime) are on such a " native " basis. Moreover, the comparative absence of Piedmont species from the Coast Strip and abundance of them in the Middle District seems rather a question of area available than of ability to support them. More than two-fifths of the plants on Seven Mile Beach belong to the region of the Undifferentiated Coastal Plain, a proportion which would be expected from the situation of the island. Of this element may be noted: *Thelypteris palustris, Juniperus virginiana* var. *crebra, Typha latifolia, T. angustifolia, Elymus virginicus, Panicum clandestinum, P. virgatum, Cyperus Grayi, Carex Swanii, C. comosa, Juncus effusus* var. *solutus, Iris versicolor, Salix nigra* var. *falcata, Quercus phellos, Rumex verticillatus, Ranunculus sceleratus, Liquidambar Styraciflua, Rubus argutus, Rosa virginiana, Prunus serotina, Strophostyles helvola, S. umbellata, Oxalis stricta, Rhus copallina, R. Toxicodendron, Euonymus americanus, Hibiscus Moscheutos, Oenothera fruticosa, Diospyros virginiana, Convolvulus sepium, Salvia lyrata, Lycopus americanus, Tecoma radicans, Galium pilosum, G. Claytoni, Mitchella repens, Sambucus canadensis, Mikania scandens, Aster lateriflorus, Helianthus giganteus,* and *Bidens connata.* Because of their great interest, the Piedmont plants have been separated out as a subdivision of the Undifferentiated Coastal Plain. Thirteen of these have been discovered on the island: *Poa cuspidata, Smilacina stellata, Morus rubra, Silene stellata, Aquilegia canadensis, Phaseolus polystachyus, Celastrus scandens, Geranium Robertianum, Verbena urticaefolia, Teucrium canadense* var. *virginicum, Scrophularia lanceolata, Galium circaezans,* and *G. triflorum.* This is a small list as compared with the 265 species in West Jersey, but they are included in an area 1.5 miles long and 500 feet wide. Furthermore, it is interesting that some of these are very well established. Particularly is this true of *Poa cuspidata, Aquilegia canadensis,* and *Celastrus scandens,* which range almost the length of the woods.

General

About one third of the plants of the island are of widespread occurrence in southern New Jersey. Among these have been included species which are not strictly universal, i. e., those which commonly enter the western and southern part of the Pine Barrens, not its eastern, more thoroughly "barren" areas. Some of the most common general species on the island are as follows: *Triplasis purpurea, Cyperus cylindricus, Carex Longii, Scirpus americanus, S. Eriophorum, Juncus dichotomus, J. canadensis, Smilax rotundifolia, Myrica carolinensis, Quercus stellata, Q. falcata, Polygonella articulata, Magnolia virginiana, Sassafras variifolium, Lepidium virginicum, Pyrus arbutifolia, Amelanchier oblongifolia, Rubus cuneifolius, Prunus maritima, Apios tuberosa, Linum medium, Acer rubrum* var. *tridens, Helianthemum canadense, Lechea Leggettii, Ludvigia alternifolia, Nyssa sylvatica, Vaccinium corymbosum, V. atrococcum, Linaria canadensis, Eupatorium album, E. hyssopifolium, E. rotundifolium* var. *ovatum, Solidago suaveolens, S. nemoralis, S. tenuifolia, Aster novi-belgii, Erigeron ramosus, Gnaphalium obtusifolium,* and *Krigia virginica.*

Maritime

Nearly one-fifth of the native plants in number of species, and by far the greatest number of individuals, are maritime. A characteristic list includes: *Ammophila breviligulata, Andropogon scoparius* var. *polycladus, Cenchrus tribuloides, Distichlis spicata, Elymus virginicus* var. *halophilus, Festuca rubra, Panicum amarum, Spartina alterniflora* var. *pilosa, S. patens, Cyperus filicinus, Juncus Gerardi, Atriplex arenaria, Salicornia ambigua, S. herbacea, S. mucronata, Salsola Kali, Suaeda linearis, Arenaria peploides* var. *robusta, Spergularia leiosperma, Cakile edentula, Euphorbia polygonifolia, Limonium carolinianum, Sabatia stellaris, Plantago oliganthos, Baccharis halimifolia, Iva frutescens* var. *oraria, Pluchea camphorata, Solidago graminifolia, S. sempervirens, Aster tenuifolius,* and *Xanthium echinatum.*

Elements in the Flora—Introduced

Fifty introduced species have been collected from the island. The most prominent of these are the yarrow (*Achillea Millefolium*) in the thickets and the Japanese honeysuckle (*Lonicera japonica*) in the woods. Most of the others are in local patches near house-sites or on filled-in ground.

Elements in the Flora—North America

By far the greater part of the plants on the island represent species which are widespread in eastern North America, that is, they range from Labrador, Nova Scotia, or Maine to Virginia or Florida. About one quarter (26%) belong to the southern or coastal plain element, which reaches its northern limits in New Jersey, Long Island, and southeastern Massachusetts. Only seven per cent of the species are northern, that is, reaching their southern limits in New Jersey or the adjacent states. One per cent belongs to a restricted element which grows only in New Jersey and adjoining states. Except for a slightly greater emphasis on the widespread plants, these percentages correspond in general to those obtained from Stone's (7) figures for all of southern New Jersey:

	Seven Mile Beach	Southern New Jersey
Widespread	64%	54%
Southern	26%	35%
Northern	7%	9%
Restricted	3%	2%

It is to be noted that the widespread and southern elements include certain Piedmont species which have traveled down the mountains to Georgia, and which therefore have a northern affinity despite their range, and a corresponding significance when growing on the coastal plain in southern New Jersey. These include: *Poa cuspidata, Morus rubra, Silene stellata, Aquilegia canadensis, Phaseolus polystachyus, Celastrus scandens, Verbena utricaefolia, Teucrium canadense* var. *virginicum, Galium circaezans,* and *G. triflorum.*

Summary

The results of the study are summarized in the following table:

Total number of species and varieties known from Seven Mile Beach		416	
Introduced	63		
Native	353		
Species added by this study to Seven Mile Beach		111	
Introduced	37		
Native	74		
Species added by this study to the coast island flora of N. J.		34	
Introduced	17		
Native	17		
New Jersey elements in the native flora			
General		128	36.2%
Undifferentiated Coastal Plain		162	45.8%
Pine Barren		1	0.2%
Maritime		61	17.8%

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Part II: ANNOTATED LIST OF THE VASCULAR FLORA

EXPLANATION OF THE TABLES

RANGE: The range in North America is self-explanatory. North and south, rather than westward extension has been considered. The terms employed in the New Jersey ranges have been discussed under *Elements in the Flora.* No attempt has been made to give the New Jersey range of introduced species because the collections are very inadequate.

Habitat: The habitats are those in which specimens were collected, except when the plant was not personally observed or there was no habitat on the label of the collector. In that case, the plant's usual habitat was combined with those available on the island to make the probable one.

Localities and Collectors on Seven Mile Beach: Directions have been omitted in these in order to save space. A combination of " woods " and " Peermont " usually means south of Peermont. The sand dunes and marshes are only rarely within the towns. On the other hand, the swamp and woods in Avalon are surrounded by houses. The initials of the collector follow in parentheses.

Nomenclature and Synonymy: The International Rules of Botanical Nomenclature have been followed. Synonyms are included in parentheses when the name used differs from that given in the last edition of Gray's Manual (1908).

Symbols Employed in the Tables

Range—North America (= NA)

N = northern (southern limit in N. J., Del., Md., or Va.)
S = southern (northern limit in N. J., L. I., Conn. or Mass.)
W = widespread along the Atlantic seaboard of N. A.
R = restricted to N. J. and adjoining States

Range—Southern New Jersey (= NJ)

PB = Pine Barren
CP = Undifferentiated Coastal Plain
Ma = Maritime
G = General in S. N. J.
In = Introduced

Habitat

Beach = beach
Dr Op Sd = dry open sand
Fr Mar = fresh marsh
Sd Dune = sand dune
Sd Du Ho = sand dune hollow
Sal Mar = salt marsh
Sal Mar Bord = salt marsh border
Swamp = swamp
Thick = thicket
Wood = woods
Wet Sd = Wet sand
Open Wood = dry, sandy, opening in woods

Localities on Seven Mile Beach

Ava = Avalon
Peer = Peermont
St. Har = Stone Harbor
Cr. I. = Crab Island
n Cr. I. = island north of Crab Is.

Collectors and Herbaria

WB = Walter Benner (University of Pennsylvania, Philadelphia Botanical Club)
JBB = J. B. Brinton (U of P)
SB = Stewardson Brown (PBC)
RRD = R. R. Dreisbach (PBC)
FF = Flora Fender (U of P, PBC, Morris Arboretum)

JMF = John M. Fogg, Jr. (U of P, PBC)
AJ = Albrecht Jahn (PBC)
IK = Ida Keller (PBC)
CK = Charles Knopf (U of P)
BL = Bayard Long (PBC, U of P)
FWP = F. W. Pennell (PBC, U of P)
HS = Hugh Stone (PBC)
WS = Witmer Stone (PBC)
SSVP = S. S. Van Pelt (PBC)
CSW = C. S. Williamson (PBC)

	Range			
Species	NA	NJ	Habitat	Localities and Collectors
POLYPODIACEAE				
Asplenium platyneuron (L.) Oakes	W	G	Woods	Peer (WS, CSW)
Thelypteris palustris Schott (*Aspidium Thelypteris*)	W	CP	Fr Mar	Peer (FF, FWP, WS)
Pteridium aquilinum (L.) Kuhn (*Pteris aquilina*)	W	G	Thick	Peer (FF)
Onoclea sensibilis L.	W	CP	Swamp	St Har (FF)
OSMUNDACEAE				
Osmunda regalis L.	W	G	Swamp	St Har (FF)
O. cinnamomea L.	W	G	Swamp	Ava (FF)
OPHIOGLOSSACEAE				
Botrychium dissectum Spreng. f. obliquum (Muhl.) Fernald (*B. obliquum* var. *dissectum*)	S	G	Woods	Peer (FF, CK)
EQUISETACEAE				
Equisetum arvense L.	W	CP	Dr Op Sd	Ava (FF)
LYCOPODIACEAE				
Lycopodium inundatum L. var. Bigelovii Tuckerm.	R	G	Sd Du Ho	Peer (FWP)
PINACEAE				
Pinus rigida Mill.	W	G	Dr Op Sd	Peer (FF)
Juniperus virginiana L. var. crebra Fernald	N	CP	Woods Thick	Peer (FF, WS), St. Har (FF), Cr I (FF, JMF)
TYPHACEAE				
Typha latifolia L.	W	CP	Fr Mar	Ava (FF, JMF, SB), Peer (FWP), St Har (WB)
T. angustifolia L.	W	CP	Fr Mar	Ava (SSVP), Peer (FF, JMF, SSVP)
NAIADACAE				
Ruppia maritima L.	W	Ma	Sal Mar Pools	Peer (WS), St Har (SSVP, CSW)
Zostera marina L.	W	Ma	Sal Mar	reported by O. Brown
GRAMINEAE				
Poa annua L.	W	In	Dr Op Sd	Ava (BL)
P. pratensis L.	W	In	Open Woods	Peer (FF)
P. cuspidata Nutt. (*P. brachyphylla*)	S	CP	Woods	Peer (FF)
P. compressa L.	W	In	Woods	Peer (FF)
Eragrostis caroliniana (Spreng.) Scribn. (*E. Purshii*)	W	G	Sd Dune	Ava (FF, JMF, HS)
E. pectinacea (Michx.) Steud. var. spectabilis Gray	W	Ma	Sd Dune	Ava (JMF), Peer (FWP), St Har (FF)
Distichlis spicata (L.) Greene	W	Ma	Sal Mar	Ava (FF, HS), Peer (SSVP), St Har (FF, RRD)
Uniola laxa (L.) BSP.	S	CP	Wet Sd	Peer (FWP)
Phragmites communis Trin.	W	CP	Wet Sd	St Har (FF)
Triodia flava (L.) Smyth (*Tridens flavus*)	S	CP	Woods	Ava (FF)
Bromus tectorum L.	W	In	Sd Dune, Dr Op Sd	Ava (Clarke), Peer (FF)

Species	Range		Habitat	Localities and Collectors
	NA	NJ		
Festuca octoflora Walt.	W	G	Dr Op Sd	Peer (FF)
F. myuros L.	W	In	Dr Op Sd	Peer (FF)
F. rubra L.	W	Ma	Dr Op Sd, Thick	Ava (BL), Peer (FF), CrI (FF), St Har (FF, SSVP)
F. elatior L.	W	In	Dr Op Sd	reported by O. Brown
Glyceria septentrionalis Hitchc.	W	CP	Fr Mar	Peer (WS), St Har (SSVP)
G. obtusa (Muhl.) Trin.	N	G	Swamp	Peer (HS)
G. pallida (Torr.) Trin.	W	CP	Swamp	Peer (FF)
Triplasis purpurea (Walt.) Chapm.	W	G	Sd Dune, Dr Op Sd	Ava (FF, JMF, HS), Peer (SSVP), St Har (FF)
Agropyron repens (L.) Beauv.	W	In	Dr Op Sd	St Har (WB)
Elymus australis S & B var. glabriflorus Wiegand (*E. canadensis*, in part)	W	Ma	Sal Mar Bord	Ava (JMF, HS), St Har (WB)
E. virginicus L.	W	CP	Dr Op Sd, Thick	Ava (FF), Peer (FWP), Cr I (FF, JMF)
E. v. var. halophilus (Bickn.) Wiegand	N	Ma	Dr Op Sd, Thick	Peer (FF, FWP), Cr I (FF)
Sphenopholis obtusata (Michx.) Scribn.	S	CP	Dr Op Sd	Peer (FF, HS), St Har (SSVP)
Aira praecox L.	R	In	Dr Op Sd	Ava (BL)
Holcus lanatus L.	W	In	Dr Op Sd	Ava (SSVP), Peer (FF, HS)
Danthonia spicata (L.) Beauv.	W	G	Open Woods	Peer (FF, WS)
Ammophila breviligulata Fernald (*A. arenaria*)	W	Ma	Sd Dune	Ava (JMF, Kaji), Peer (FF), St Har (FF, HS)
Agrostis stolonifera L. (*A. alba* var. *vulgaris*)	N	In	Dr Op Sd	St Har (WB)
A. perennans (Walt.) Tuckerm.	W	CP	Woods	Ava (FF)
Cinna arundinacea L.	W	CP	Woods	Peer (WS)
Aristida purpurascens Poir.	S	G	Open Woods	Peer (SSVP)
Cynodon Dactylon (L.) Pers.	S	In	Dr Op Sd	Ava (BL)
Spartina cynosuroides (L.) Roth	S	Ma	Sal Mar	Ava (HS)
S. alterniflora Loisel var. pilosa Merr. (*S. glabra* var. *pilosa*)	W	Ma	Sal Mar	Ava (JMF), Peer (FF), St Har (RRD, FF)
S. patens (Ait.) Muhl.	W	Ma	Sal Mar, Sd Dune	Ava (FF, HS), Peer (FF), St Har (FF, SB, Jahn)
S. p. var. juncea (Michx.) Hitchc.	W	Ma	Sal Mar, Sd Dune	Ava (JBB, JMF, Witte), St Har (FF)
Anthoxanthum odoratum L.	W	In	Dr Op Sd	Ava (FF), Peer (CK)
Leersia oryzoides (L.) Sw.	W	CP	Swamp	Peer (WS)
Digitaria sanguinalis (L.) Scop.	W	In	Dr Op Sd	Ava (FF, JMF), St Har (WS)
Paspalum setaceum Michx.	W	G	Dr Op Sd	Peer (FWP)
P. pubescens Muhl.	S	G	Dr Op Sd	St Har (WB)
Panicum verrucosum Muhl.	S	G	Wet Sd	reported by O. Brown
P. microcarpon Muhl.	S	CP	Woods	Ava (SSVP), Peer (WS)
P. Lindheimeri Nash. var. fasciculatum (Torr.) Fernald (*P. huachucae*, *P. tennesseense*)	W	CP	Woods, Sd Dune	Ava (SSVP), Peer (FF, SSVP)
P. meridionale Ashe	S	G	Woods	Peer (HS)
P. lanuginosum Ell.	S	CP	Sal Mar Bord, Woods	Ava (HS), Peer (SSVP, WS)
P. villosissimum Nash	S	G	Woods	Ava (SSVP)
P. Addisonii Nash	S	G	Dr Op Sd	Peer (WS)
P. sphaerocarpon Ell.	W	G	Dr Op Sd	Ava (SSVP), Peer (SSVP)
P. scoparium Lam.	S	G	Woods, Thick	Ava (FF, HS), Peer (SB, FF), St Har (WB, Jahn)
P. clandestinum L.	W	CP	Thick	Peer (FF, SSVP)
P. dichotomiflorum Michx.	W	CP	Wet Sd	Peer (FWP)
P. amarum Ell.	S	Ma	Sd Dune	Ava (FF, JMF, HS), St Har (FF)

Species	Range		Habitat	Localities and Collectors
	NA	NJ		
Panicum amarulum H. & C.	S	Ma	Dr Op Sd	St Har (FF)
P. virgatum L.	W	CP	Dry or Wet Sd	Ava (JMF), Peer (FF), St Har (WS)
P. v. var. spissum Linder	N	G	Dr Op Sd	Ava (FF)
P. longifolium Torr.	W	G	Wet Sd	reported by O. Brown
P. condensum Nash	S	CP	Fr Mar	Peer (WS)
Echinochloa Walteri (Pursh) Nash	S	Ma	Sal Mar Bord	Ava (FF, CK)
Setaria geniculata (Lam.) Beauv. (*S. imberbis* var. *perennis*)	S	Ma	Sal Mar Bord	Peer (FWP)
S. viridis (L.) Beauv.	W	In	Dr Op Sd	Ava (FF)
Cenchrus pauciflorus Benth. (*C. carolinianus*)	W	G	Sd Dune, Dr Op Sd	Ava (FF), Peer (FF)
C. tribuloides L.	S	Ma	Sd Dune	Ava (FF, JMF, BL), St Har (RRD)
Andropogon scoparius Michx. var. polycladus S. & B. (*A. s.* var. *littoralis*)	S	Ma	Dr Op Sd	Ava (FF), Peer (FWP), St Har (FF)
A. glomeratus (Walt.) BSP.	S	G	Dr Op Sd	reported by O. Brown
A. virginicus L.	S	G	Dr Op Sd	reported by O. Brown
CYPERACEAE				
Cyperus filicinus Vahl (*C. Nuttallii*)	W	Ma	Sal Mar, Fr Mar	Ava (FF, JMF, HS), Peer (FWP, SSVP)
C. ferax Rich.	S	Ma	Sd Dune, Dr Op Sd	Ava (FF, JMF), Peer (FWP, SSVP), St Har (FF, SSVP)
C. esculentus L.	W	CP	Sd Du Ho	Ava (FF, JMF, HS), Peer (SSVP)
C. strigosus L.	W	CP	Fr Mar, Wet Sd	Peer (FWP), St Har (FF)
C. cylindricus (Ell.) Britton	S	G	Dr Op Sd	Peer (FF, SSVP), n Cr I (FF)
C. ovularis (Michx.) Torr.	S	CP	Dr Op Sd	reported by O. Brown
C. Grayi Torr.	R	CP	Sd Dune, Dr Op Sd	Peer (FF, SSVP), St Har (SB, FF, SSVP)
C. filiculmis Vahl. var. macilentus Fernald	W	G	Dr Op Sd	Peer (FF), St Har (WB)
Eleocharis parvula (R. & S.) Link (*Scirpus nanus*)	W	Ma	Sal Mar	Ava (FWP)
E. Smallii Britton (*E. palustris,* in part)	N	CP	Fr Mar	Peer (reported in (7), but no specimen seen)
E. halophila Fernald and Bracken (*E. palustris,* in part)	N	Ma	Fr Mar	Peer (FF), St Har (FF)
E. calva Torr. (*E. palustris* var. *calva*)	W	CP	Fr Mar	Peer (SSVP)
Stenophyllus capillaris (L.) Britton	W	CP	Dr Op Sd	reported by O. Brown
Fimbristylis castanea (Michx.) Vahl.	S	Ma	Wet Sd	Ava (HS), Peer (FWP, SSVP), St Har (SB, SSVP)
F. mucronulata (Michx.) Blake (*F. autumnalis*)	S	G	Fr Mar	reported by O. Brown
Scirpus americanus Pers.	W	G	Fr Mar, Wet Sd	Ava (RRD, JMF), Peer (FF, WS), St Har (WB, HS, SSVP)
S. validus Vahl	W	CP	Fr Mar	Peer (SSVP)
S. robustus Pursh	S	Ma	Sal Mar	St Har (SSVP)
S. Eriophorum Michx.	S	G	Fr Mar	Peer (FF, FWP), Ava (FF), St Har (FF)
Rynchospora capitellata (Michx.) Vahl (*R. glomerata,* in part)	W	G	Wet Sd	Peer (FWP)
Mariscus mariscoides (Muhl.) Kuntze (*Cladium mariscoides*)	W	G	Fr Mar	reported by O. Brown

Species	Range		Habitat	Localities and Collectors
	NA	NJ		
Carex scoparia Schkuhr	W	G	Wet Sd	St Har (CSW)
C. Longii Mackenzie (*C. albolutescens*)	W	G	Thick, Dr Op Sd	Ava (JBB), Peer (FF, WS), St Har (JBB)
C. hormathodes Fernald	N	Ma	Sal Mar	Ava (FF, SSVP), Peer (SSVP)
C. silicea Olney	N	Ma	Sd Du Ho	Peer (WS), St Har (Jahn, SSVP)
C. alata Torr.	W	CP	Sal Mar Bord	Ava (SSVP), Peer (FF, WS)
C. vulpinoidea Michx.	W	CP	Fr Mar	Ava (SSVP), Peer (WS), St Har (FF)
C. crinita Lam.	W	CP	Fr Mar	reported by O. Brown
C. Swanii (Fernald) Mackenzie (*C. virescens* var. *Swanii*)	W	CP	Fr Mar	Ava (JBB, SSVP), Peer (FF, WS)
C. nigro-marginata Schwein.	S	CP	Woods	Peer (FF)
C. pennsylvanica Lam.	W	G	Woods	reported by O. Brown
C. lanuginosa Michx.	S	CP	Sal Mar Bord	Peer (FF, SSVP)
C. comosa Boott	W	CP	Swamp	Ava (JBB), Peer (FF, SSVP)
C. lurida Wahlenb.	W	G	Swamp	Peer (SSVP)
JUNCACEAE				
Juncus bufonius L.	W	CP	Sd Du Ho, Dr Op Sd	Ava (RRD, BL), Peer (FF, WS), St Har (CSW, SSVP)
J. Gerardi Loisel.	W	Ma	Sal Mar, Sd Du Ho	Peer (FF, SSVP), St Har (WB)
J. tenuis Willd.	W	CP	Open Woods	Peer (FF)
J. dichotomus Ell.	S	G	Fr Mar	Ava (RRD), Peer (FF, FWP), St Har (JBB)
J. effusus L. var. solutus Fernald & Wiegand	W	G	Fr Mar	Peer (FF)
J. canadensis J. Gay	W	G	Fr Mar, Wet Sd	Peer (FF, FWP)
J. scirpoides Lam.	S	CP	Fr Mar	Ava (RRD), Peer (FF, WS) St Har (WB, Jahn)
J. acuminatus Michx.	W	G	Fr Mar	Ava (SSVP), Peer (FWP, WS)
J. aristulatus Michx.	S	G	Fr Mar	Peer (FWP)
Luzula campestris (L.) DC. var. bulbosa A. Wood	S	CP	Wet Sd	Peer (FF)
LILIACEAE				
Hemerocallis fulva L.	W	In	Dr Op Sd	St Har (FF)
Lilium superbum L.	W	G	Fr Mar	Peer (FF, FWP)
Asparagus officinalis L.	W	In	Woods	Peer (FF)
Smilacina stellata (L.) Desf.	N	CP	Open Wood	Peer (FF, SB)
Maianthemum canadense Desf.	W	CP	Woods	Peer (FF)
Polygonatum biflorum (Walt.) Ell. (*P. commutatum*)	W	CP	Woods	Ava (FF, FWP), Peer (FF, WS)
Aletris farinosa L.	W	G	Woods	St Har (SB)
Smilax rotundifolia L.	W	G	Woods	Peer (FF)
S. glauca L.	S	G	Thick	Peer (FF)
IRIDACEAE				
Iris versicolor L.	W	CP	Fr Mar	Peer (FF, WS, SSVP), Ava (FF)
Sisyrinchium gramineum Curtis	W	CP	Fr Mar	Ava (FF), Peer (FF, SSVP)
S. atlanticum Bicknell	W	G	Wet Sd	Ava (SSVP), Peer (FF)
ORCHIDACEAE				
Spiranthes vernalis Engelm & Gray	S	CP	Wet Sd	Ava (IK, FWP), Peer (FF)
S. cernua (L.) Richards.	W	G	Wet Sd	Peer (FWP)
SALICACEAE				
Salix nigra Marsh. var. falcata (Pursh.) Torr.	N	CP	Swamp, Sd Du Ho	Peer (FF, WS), Ava (FF)
Populus alba L.	W	In	Dr Op Sd	St Har (FF)

	Range			
Species	NA	NJ	Habitat	Localities and Collectors
MYRICACEAE				
Myrica carolinensis Mill.	W	G	Sd Du Ho, Woods	Peer (FWP), St Har (FF), Cr I (JMF) Ava (FF)
M. asplenifolia L.	W	G	Dr Op Sd	Ava (BL, HS), St Har (FF)
FAGACEAE				
Quercus stellata Wang.	S	G	Woods	Ava (SSVP), Peer (SB, FF), n Cr I (JMF)
Q. falcata Michx.	S	G	Woods	Peer (FF)
Q. phellos L.	S	CP	Woods	Peer (FF)
URTICACEAE				
Celtis occidentalis L.	W	CP	Woods	Peer (FF, SSVP), Ava (FF)
Morus rubra L.	W	CP	Woods	Peer (FF, WS)
Boehmeria cylindrica (L.) Sw.	W	CP	Woods	Peer (FWP)
POLYGONACEAE				
Rumex verticillatus L.	W	CP	Swamp	Ava (FWP), Peer (FF, SSVP)
R. crispus L.	W	In	Dr Op Sd	Peer (FF)
R. Acetosella L.	W	In	Woods, Dr Op Sd	Ava (FF, Kaji), Peer (FF), St Har (FF)
Polygonum prolificum (Small) Robinson	W	Ma	Sal Mar Bord	Peer (FF, WS), St Har (SSVP)
P. aviculare L.	W	G	Sal Mar, Fr Mar	Ava (FF, HS), St Har (FF)
P. pennsylvanicum L.	S	G	Wet Sd	Ava (Kaji)
P. punctatum Ell. (*P. acre*)	S	CP	Fr Mar	Ava (FF, JMF), Peer (FF, WS) St Har (FF)
P. Persicaria L.	W	In	Sal Mar Bord	Ava (RRD, JMF)
P. sagittatum L.	W	CP	Fr Mar	Peer (FWP)
Polygonella articulata (L.) Meisn.	W	G	Sd Dune, Wet Sd	Peer (FF), St Har (FF)
CHENOPODIACEAE				
Cycloloma atriplicifolium (Spreng) Coult.	W	In	Beach	Ava (FF, JMF), St Har (SB, FF)
Chenopodium ambrosioides L.	W	In	Beach	Peer (FWP), Cr I (FF, JMF)
C. album L.	W	In	Sd Du Ho	Ava (FF, BL)
C. Boscianum Moq.	W	CP	Woods	reported by O. Brown
C. leptophyllum Nutt.	N	CP	Open Wood	Ava (FF, BL)
Atriplex patula L. var. hastata (L.) Gray	W	CP	Sal Mar Bord	Ava (FF), Peer (FF), St Har (FF), n Cr I (FF, JMF)
A. arenaria Nutt.	S	Ma	Beach	Ava (BL), Peer (FWP, WS), St Har (FF, SSVP), Cr I (FF, JMF)
Bassia hirsuta (L.) Aschers.	R	Ma	Sal Mar	Ava (FWP)
Salicornia mucronata Bigel.	W	Ma	Sal Mar	Ava (FF), Peer (FF, FWP), St Har (SSVP)
S. herbacea L. (*S. europaea*)	W	Ma	Sal Mar	Ava (FF, JMF, Kaji), Peer (FWP), n Cr I (FF, JMF)
S. ambigua Michx.	W	Ma	Sal Mar	Peer (SSVP), St Har (FF), n Cr I (FF, JMF)
Suaeda linearis (Ell.) Moq.	W	Ma	Sal Mar	Peer (FWP), St Har (FF), n Cr I (FF, JMF)
Salsola Kali L.	W	Ma	Beach	Ava (FF, JMF, RRD), Peer (FWP), St Har (FF)
PHYTOLACCACEAE				
Phytolacca americana L.	W	CP	Thick	Peer (FF), St Har (WB)
CORRIGIOLACEAE				
Scleranthus annuus L.	W	In	Dr Op Sd	Ava (RRD)

Species	Range		Habitat	Localities and Collectors
	NA	NJ		
AIZOACEAE				
Sesuvium maritimum (Walt.) BSP.	S	Ma	Sal Mar	Ava (FWP), St Har (FF)
CARYOPHYLLACEAE				
Spergularia leiosperma (Kindberg) F. Schmidt (*S. marina,* in part)	N	Ma	Sal Mar	Peer (FF), St Har (WB)
Sagina decumbens (Ell.) T. & G.	N	CP	Sd Du Ho	Ava (CSW), St Har (CSW)
Arenaria peploides L. var. robusta Fernald	N	Ma	Beach	Ava (FWP), Peer (FF, WS), St Har (SSVP & CSW)
Stellaria media (L.) Cyrill	W	In	Dr Op Sd	St Har (FF)
Cerastium vulgatum L.	W	In	Dr Op Sd	Peer (FF), St Har (FF)
C. semidecandrum L.	R	In	Dr Op Sd	Peer (CSW)
Silene pennsylvanica Michx.	S	CP	Woods	Peer (FF, CK, CSW), St Har (McCadden)
S. stellata (L.) Ait. f.	S	CP	Woods	Peer (FF)
Dianthus armeria L.	R	In	Dr Op Sd	St Har (FF, WB)
RANUNCULACEAE				
Ranunculus sceleratus L.	W	CP	Fr Mar	Peer (WS), Ava (FF)
Aquilegia canadensis L.	W	CP	Woods	Peer (FF, WS), St Har (CSW)
MAGNOLIACEAE				
Magnolia virginiana L.	S	G	Swamp	Peer (FF, WS & SSVP)
LAURACEAE				
Sassafras variifolium (Salisb.) Ktze.	W	G	Woods, Sd Dune	Peer (FF, WS), St Har (FF)
CRUCIFERAE				
Draba verna L.	S	In	Dr Op Sd	St Har (FF)
Lepidium virginicum L.	W	G	Dr Op Sd, Thick	Ava (FF, JMF), Peer (FF), St Har (FF), n Cr I (FF, JMF)
Capsella Bursa-pastoris (L.) Medic.	W	In	Open Woods	Peer (FF)
Cakile edentula (Bigel.) Hook.	W	Ma	Beach	Ava (RRD, JMF, Witte), Peer (FF), St Har (WB, SB)
Raphanus Raphanistrum L.	N	In	Dr Op Sd	Ava (FF)
Sisymbrium Thalianum (L.) J. Gay	S	In	Dr Op Sd	Peer (CK)
Cardamine parviflora L.	W	CP	Woods	Peer (CSW)
Arabis lyrata L.	W	CP	Woods	Ava (SB), Peer (WS)
CRASSULACEAE				
Sedum acre L.	W	In	Dr Op Sd	Ava (Kaji, BL)
HAMAMELIDACEAE				
Liquidambar Styraciflua L.	S	CP	Swamp	Peer (FF)
ROSACEAE				
Pyrus arbutifolia (L.) L. f.	S	G	Woods	Peer (FF)
P. a. var atropurpurea (Britton) Robinson	W	CP	Swamp	Ava (FF)
Amelanchier oblongifolia (T. & G.) Roem.	W	G	Woods	Peer (FF, WS), Ava (FF)
Fragaria virginiana Duchesne	W	CP	Woods	Ava (FF), Peer (FF, WS)
Potentilla recta L.	N	In	Dr Op Sd	Peer (FF)
P. pumila Poir.	W	CP	Dr Op Sd	reported by O. Brown
P. canadensis L.	W	CP	Dr Op Sd	reported by O. Brown
Geum canadense Jacq.	W	CP	Woods, Dr Op Sd	Ava (JBB, BL, FWP), Peer (FF, WS)
Rubus argutus Link	W	CP	Woods	Peer (SB, FF, WS, CSW), St Har (CSW)

	Range			
Species	NA	NJ	Habitat	Localities and Collectors
Rubus cuneifolius Pursh	S	G	Woods	Ava (SB), Peer (FF), St Har (Jahn)
R. hispidus L.	W	G	Fr Mar	reported by O. Brown
R. Baileyanus Britton (*R. villosus* var. *humifusus*)	S	CP	Woods	Peer (FF)
R. flagellaris Willd. (*R. villosus*)	W	G	Sd Du Ho	Peer (SB, FF), St Har (CSW)
Rosa palustris Marsh. (*R. carolina*)	W	CP	Swamp	Ava (JBB), Peer (FF, FWP)
R. virginiana Mill	N	CP	Sd Dune	Peer (FWP), St Har (FF)
R. carolina L. (*R. humilis*)	W	G	Dr Op Sd	Ava (SSVP), Peer (FF, WS)
R. rugosa Thunb.	N	In	Sd Dune	St Har (FF)
Prunus serotina Ehrh.	W	CP	Sd Dune, Woods	Ava (FF, HS), Peer (FF, WS), St Har (FF, CSW)
P. maritima Wang.	W	G	Sd Dune	Ava (HS), Peer (FF)
LEGUMINOSAE				
Cassia Chamaecrista L.	S	CP	Dr Op Sd	Peer (FF, CK, FWP), St Har (FF)
C. nictitans L.	W	CP	Woods edge	Peer (FF)
Baptisia tinctoria (L.) R. Br.	W	G	Dr Op Sd	Peer (FF), St Har (WB)
Trifolium arvense L.	W	In	Dr Op Sd	St Har (FF, WB)
T. pratense L.	W	In	Dr Op Sd	Peer (FF)
T. repens L.	W	In	Dr Op Sd	reported by O. Brown
T. hybridum L.	W	In	Dr Op Sd	reported by O. Brown
T. procumbens L.	W	In	Dr Op Sd	Peer (FF)
T. dubium Sibth.	R	In	Dr Op Sd	Ava (SSVP), Peer (CSW)
Melilotus officinalis (L.) Lam.	W	In	Dr Op Sd	St Har (FF)
M. alba Desr.	W	In	Dr Op Sd	reported by O. Brown
Robinia pseudo-acacia L.	R	In	Dr Op Sd	Peer (FF)
Desmodium Dillenii Darl.	W	G	Wet Sd	reported by O. Brown
D. paniculatum (L.) DC.	W	CP	Swamp edge	Ava (FF), Peer (FWP)
D. obtusum (Muhl.) DC.	S	G	Sd Du Ho	Peer (FWP)
Lespedeza procumbens Michx.	W	CP	Dr Op Sd	Peer (FWP)
L. frutescens (L.) Britton	W	G	Dr Op Sd	Peer (FWP)
L. capitata Michx.	W	G	Dr Op Sd	Peer (FF, WS)
L. striata (Thunb.) H. & A.	S	In	Dr Op Sd	Peer (FWP), St Har (SSVP)
Vicia villosa Roth	W	In	Dr Op Sd	Peer (FF)
Apios tuberosa Moench	W	G	Fr Mar	Ava (HS), Peer (FF, FWP)
Phaseolus polystachyus (L.) BSP.	S	CP	Woods	Ava (HS), Peer (FF, WS)
Strophostyles helvola (L.) Britton	S	CP	Dr Op Sd, Sd Du Ho	Ava (FF, JMF), Peer (FWP, FF)
S. umbellata (Muhl.) Britton	S	CP	Dr Op Sd, Sd Du Ho	Peer (FF)
Amphicarpa Pitcheri T. & G.	S	CP	Woods	reported by O. Brown
LINACEAE				
Linum medium (Planch.) Britton	W	G	Dr Op Sd	Ava (RRD), Peer (FF, WS), St Har (WB, SB, FF, WS)
OXALIDACEAE				
Oxalis stricta L.	W	CP	Woods	Ava (SB, FF), Peer (FF), St Har (CSW)
GERANIACEAE				
Geranium Robertianum L.	N	CP	Woods	Peer (SB, CK, FF, CSW), St Har (Jahn)
POLYGALACEAE				
Polygala cruciata L.	W	G	Fr Mar	reported by O. Brown
P. verticillata L.	W	CP	Dr Op Sd	Ava (FWP), Peer (WS), St Har (SSVP)

Species	Range		Habitat	Localities and Collectors
	NA	NJ		
EUPHORBIACEAE				
Euphorbia polygonifolia L.	W	Ma	Sd Dune, Beach	Ava (RRD, FF, JMF), Peer (FF, FWP), St Har (WS)
E. nutans Lag. (*E. Preslii*)	S	CP	Dr Op Sd	Ava (FF)
E. maculata L.	W	CP	Dr Op Sd	reported by O. Brown
ANACARDIACEAE				
Rhus copallina L.	W	CP	Woods	Peer (FF, WS)
R. vernix L.	W	G	Swamp	reported by O. Brown
R. Toxicodendron L.	S	CP	Woods, Sd Dune	Ava (FF, HS), Peer (FF, FWP), St Har (FF)
AQUIFOLIACEAE				
Ilex opaca Ait.	S	G	Woods, Thick	Peer (FF, WS), St Har (FF, WS)
I. verticillata (L.) Gray	W	G	Swamp	reported by O. Brown
CELASTRACEAE				
Euonymus americanus L.	S	CP	Woods	Peer (FF)
Celastrus scandens L.	W	CP	Woods	Ava (FF), Peer (FF, WS), St Har (FF)
ACERACEAE				
Acer rubrum L. var. tridens Wood	S	G	Swamp	Peer (FF, WS), St Har (FF)
BALSAMINACEAE				
Impatiens biflora Walt.	W	CP	Swamp	Ava (FF), Peer (FF), St Har (FF)
VITACEAE				
Psedera quinquefolia (L.) Greene	W	CP	Woods, Sd Dune	Peer (FF, FWP, WS), St Har (FF)
Vitis labrusca L.	W	CP	Woods, Sd Dune	Peer (FF, FWP), St Har (FF)
V. aestivalis Michx.	W	G	Woods, Sd Dune	Peer (SSVP, FWP), St Har (FF)
MALVACEAE				
Kosteletzkya virginica (L.) Presl	S	Ma	Sal Mar	Ava (CK, Witte), Peer (SB, IK), St Har (FF)
Hibiscus Moscheutos L.	S	CP	Sal Mar, Fr Mar	Ava (FF, JMF, IK), Peer (FF, WS), St Har (FF, RRD)
HYPERICACEAE				
Hypericum mutilum L.	W	CP	Swamp	Peer (CK, FWP), St Har (FF)
H. canadense L.	W	G	Wet Sd	Peer (FWP)
H. gentianoides (L.) BSP.	W	G	Dr Op Sd	Peer (FWP)
H. virginicum L.	W	G	Fr Mar	Peer (FF)
CISTACEAE				
Helianthemum canadense (L?) Michx.	W	G	Open Wood	Peer (FF, SSVP)
Hudsonia tomentosa Nutt.	N	Ma	Sd Dune	reported by O. Brown
Lechea minor L.	W	G	Dr Op Sd	reported by O. Brown
L. maritima Leggett	W	Ma	Dr Op Sd	St Har (FF)
L. Leggettii Britton & Hollick	S	G	Dr Op Sd	Peer (FF, FWP)
CACTACEAE				
Opuntia vulgaris Mill.	S	CP	Open Wood	Peer (FF), St Har (FF)
LYTHRACEAE				
Decodon verticillatus (L.) Ell.	W	G	Swamp	reported by O. Brown
MELASTOMACEAE				
Rhexia virginica L.	W	G	Fr Mar	reported by O. Brown
R. mariana L.	S	G	Fr Mar	Peer (FWP)

Species	Range		Habitat	Localities and Collectors
	NA	NJ		
ONAGRACEAE				
Ludvigia alternifolia L.	S	G	Fr Mar	Peer (FF)
L. palustris (L.) Ell.	W	CP	Fr Mar	Ava (JBB)
Oenothera biennis L.	W	CP	Sd Dune, Dr Op Sd	Ava (HS), Peer (FF, FWP, WS)
O. humifusa Nutt.	S	Ma	Sd Dune	reported by O. Brown
O. laciniata Hill.	S	G	Dr Op Sd	reported by O. Brown
O. fruticosa L.	W	CP	Dr Op Sd, Thick	Ava (RRD, JMF), Peer (FF, WS), St Har (WB, SB)
O. linearis Michx.	S	G	Dr Op Sd	Peer (FF)
HALORAGIDACEAE				
Proserpinaca palustris L.	W	CP	Fr Mar	Ava (SSVP), Peer (WS)
UMBELLIFERAE				
Eryngium aquaticum L.	S	CP	Fr Mar	Peer (FWP)
Hydrocotyle umbellata L.	S	CP	Fr Mar	Peer (WS)
Ptilimnium capillaceum (Michx.) Raf.	S	CP	Sal Mar, Fr Mar	Ava (FF, JMF, WS, Witte), Peer (FF, CK)
Cicuta maculata L.	N	CP	Swamp	reported by O. Brown
Sium suave Walt. (*S. cicutifolium*)	W	CP	Fr Mar, Swamp	Peer (FF, CK, WS)
Daucus carota L.	W	In	Dr Op Sd	Ava (BL)
CORNACEAE				
Nyssa sylvatica Marsh.	W	G	Swamp	Peer (FF, WS)
ERICACEAE				
Gaylussacia baccata (Wang.) C. Koch	W	G	Woods	Peer (FF, WS)
Vaccinium corymbosum L.	W	G	Woods	Peer (FF)
V. atrococcum (Gray) Heller	W	G	Woods	Peer (FF)
PLUMBAGINACEAE				
Limonium carolinianum (Walt.) Britton	W	Ma	Sal Mar	Ava (FF, JMF, IK), Peer (FF, FWP), St Har (RRD), n Cr I (JMF)
PRIMULACEAE				
Samolus parviflorus Raf. (*S. floribundus*)	W	Ma	Sd Du Ho	Peer (SSVP)
Lysimachia quadrifolia L.	W	CP	Fr Mar	reported by O. Brown
L. terrestris (L.) BSP.	W	G	Swamp	reported by O. Brown
Trientalis americana (Pers.) Pursh	N	G	Woods	Peer (FF, CSW), St Har (McCadden)
EBENACEAE				
Diospyros virginiana L.	S	CP	Swamp, Wet Sd	Ava (FF), Peer (FF, WS)
GENTIANACEAE				
Sabatia stellaris Pursh	S	Ma	Sal Mar	Ava (FF, JMF, Witte), Peer (FF, FWP), St Har (SB, FF)
APOCYNACEAE				
Vinca minor L.	W	In	Woods	Peer (FF)
Apocynum cannabinum L.	W	CP	Thick	St Har (FF)
ASCLEPIADACEAE				
Asclepias tuberosa L.	W	G	Dr Op Sd	Peer (FF)
A. incarnata L. var. pulchra (Ehrh.) Pers.	W	CP	Sal Mar	Ava (FF, JMF), Peer (WS)
A. syriaca L.	W	G	Dr Op Sd	reported by O. Brown
CONVOLVULACEAE				
Convolvulus sepium L.	W	CP	Dr Op Sd	Peer (WS), St Har (FF)
C. s. var. pubescens (Gray) Fernald	W	Ma	Dr Op Sd, Fr Mar	Peer (FF), St Har (SB)
Cuscuta Gronovii Willd.	W	CP	Thick	Peer (FWP)

	Range			
Species	NA	NJ	Habitat	Localities and Collectors
BORAGINACEAE				
Myosotis virginica (L.) BSP.	W	CP	Woods	Peer (FF, CK)
VERBENACEAE				
Verbena urticaefolia L.	W	CP	Woods	Peer (FF)
V. hastata L.	W	CP	Sal Mar Bord	Ava (FF, JMF)
Lippia lanceolata Michx.	S	CP	Fr Mar	Ava (JBB)
LABIATAE				
Teucrium canadense L. (*T. c.* var. *littorale*)	W	Ma	Sal Mar, Sd Du Ho	Ava (FF, JMF), Peer (FF, WS), St Har (FF, WB), n Cr I (JMF)
T. c. var. virginicum (L.) Eaton (*T. canadense*)	W	CP	Woods	Peer (FF)
Trichostoma dichotomum L.	W	G	Dr Op Sd	Ava (IK), Peer (HS), St Har (FF)
Salvia lyrata L.	S	CP	Woods	Ava (FF, SSVP), Peer (WS)
Monarda punctata L.	S	G	Open Wood	Peer (FF, FWP)
Lycopus uniflorus Michx.	W	CP	Fr Mar	Peer (FWP)
L. americanus Muhl.	W	CP	Sal Mar Bord	Ava (FF, JMF, HS), Peer (FWP, WS), St Har (FF)
SOLANACEAE				
Solanum dulcamara L.	W	In	Woods	Peer (SSVP)
S. nigrum L.	W	G	Thick	St Har (FF)
Datura Stramonium L.	W	In	Dr Op Sd	reported by O. Brown
D. Tatula L.	S	In	Dr Op Sd	reported by O. Brown
SCROPHULARIACEAE				
Verbascum Thapsus L.	W	In	Dr Op Sd	St Har (WB)
V. Blattaria L.	W	In	Dr Op Sd	Peer (FF)
Linaria canadensis (L.) Dumont	W	G	Dr Op Sd	Ava (Clarke), Peer (FF, FWP), St Har (FF, WB)
Scrophularia lanceolata Pursh	W	CP	Woods	Peer (SB)
Agalinis purpurea (L.) Pennell (*Gerardia purpurea*)	S	CP	Sal Mar Bord	Ava (FF, Kaji, FWP), Peer (FF, FWP), St Har (WB, RRD, FF)
A. maritima Raf. (*Gerardia maritima*)	W	Ma	Sal Mar Bord	Peer (SB, SSVP)
BIGNONIACEAE				
Tecoma radicans (L.) Juss.	S	CP	Woods	Peer (FF, SSVP)
PLANTAGINACEAE				
Plantago major L.	N	Ma	Sal Mar	reported by O. Brown
P. arenaria L.		In	Dr Op Sd	Ava (BL)
P. oliganthos R. & S.	N	Ma	Sal Mar Bord	St Har (FF)
P. lanceolata L.	W	In	Dr Op Sd	Peer (FF, CK)
P. aristata Michx.	W	In	Dr Op Sd	Ava (FF), Peer (FF), St Har (WB, SB)
RUBIACEAE				
Galium Aparine L.	W	CP	Woods	Peer (FF), St Har (FF)
G. pilosum Ait.	W	CP	Open Woods	Ava (BL), Peer (FF), St Har (Jahn)
G. circaezans Michx.	W	CP	Woods	Peer (FF)
G. Claytoni Michx.	W	CP	Fr Mar	Ava (FF, JMF, FWP), Peer (FF, WS), St Har (FF)
G. tinctorium L.	W	CP	Woods	Peer (FF)
G. triflorum Michx.	W	CP	Woods	Peer (FF)
Diodia teres Walt.	S	G	Dr Op Sd	Ava (FF, JMF), Peer (FWP), St Har (FF)
Mitchella repens L.	W	CP	Woods	Peer (FF, WS, Walter)
CAPRIFOLIACEAE				
Lonicera japonica Thunb.	S	In	Woods	Peer (FF), St Har (FF)
L. sempervirens L.	W	CP	Woods	Peer (SB, FF, BL)

	Range			
Species	NA	NJ	Habitat	Localities and Collectors
Viburnum scabrellum (T. & G.) Chapm.	S	CP	Woods	Ava (FF), Peer (FF), St Har (FF)
V. dentatum L.	W	CP	Woods	Peer (FF)
Sambucus canadensis L.	W	CP	Woods	Peer (FF, WS)
COMPOSITAE				
Eupatorium maculatum L.	W	CP	Fr Mar	reported by O. Brown
E. album L.	S	G	Thick	Peer (FWP)
E. hyssopifolium L.	S	G	Sal Mar Bord, Thick	Ava (JMF), Peer (WS), St Har (FF)
E. verbenaefolium Michx.	S	G	Sd Du Ho	Peer (FF)
E. rotundifolium L. var. ovatum Torr. (*E. pubescens*)	N	G	Sal Mar Bord	Ava (FF, JMF), Peer (FWP, FF)
E. perfoliatum L.	W	CP	Fr Mar	reported by O. Brown
Mikania scandens (L.) Willd.	W	CP	Sal Mar, Swamp	Ava (FF, IK), Peer (SB, SSVP), St Har (FF)
Liatris graminifolia (Walt.) Willd. var. dubia Gray	S	G	Dr Op Sd	Peer (SB, FF)
Solidago bicolor L.	W	G	Woods	Peer (FF, FWP)
S. sempervirens L.	W	Ma	Fr Mar, Sd Dune, Sal Mar	Ava (FF, HS), St Har (FF)
S. suaveolens Schoepf (*S. odora*)	W	G	Woods	Peer (FWP)
S. fistulosa Mill.	S	G	Fr Mar	Peer (FF, WS)
S. rugosa var. aspera (Ait.) Fernald (*S. aspera*)	S	G	Woods	Peer (FWP)
S. nemoralis Ait.	W	G	Thick, Woods	Ava (FF), Peer (FWP), St Har (FF)
S. altissima L.	W	CP	Dr Op Sd	reported by O. Brown
S. graminifolia (L.) Salisb.	W	Ma	Sal Mar Bord	Ava (FF), Peer (FWP)
S. g. var. Nuttallii (Greene) Fernald	W	CP	Sal Mar Bord	St Har (FF)
S. tenuifolia Pursh.	S	G	Sal Mar Bord	Ava (FF, IK), Peer (FWP)
Aster patens Ait.	W	G	Woods	Peer (FWP)
A. undulatus L.	W	G	Woods	Peer (FF)
A. ericoides L.	W	CP	Woods	Peer (FWP)
A. dumosus L.	W	G	Dr Op Sd	reported by O. Brown
A. vimineus Lam.	W	CP	Thick	Ava (FF)
A. lateriflorus (L.) Britton	W	CP	Woods, Thick	Ava (FF), Peer (FF, FWP), St Har (FF)
A. novi-belgii L.	W	G	Swamp edge	Ava (FF, SB), Peer (WS)
A. umbellatus Mill.	W	CP	Fr Mar	reported by O. Brown
A. linariifolius L.	W	G	Woods	Peer (FWP)
A. tenuifolius L.	S	Ma	Sal Mar	Ava (FF, WS), Peer (FWP), St Har (FF)
A. subulatus Michx.	W	Ma	Sal Mar	St Har (FF)
Erigeron ramosus (Walt.) BSP.	W	G	Fr Mar	Peer (FF, Walter)
E. annuus (L.) Pers.	W	CP	Dr Op Sd	reported by O. Brown
E. pusillus Nutt.	S	CP	Dr Op Sd	Ava (FF, IK), Peer (FF)
E. canadensis L.	W	CP	Dr Op Sd	reported by O. Brown
Baccharis halimifolia L.	S	Ma	Sal Mar, Sd Du Ho	Ava (JMF, IK), Peer (FF, FWP), St Har (FF)
Pluchea camphorata (L.) DC.	S	Ma	Sal Mar	Ava (FF, IK, Witte), Peer (SSVP)
Gnaphalium obtusifolium L. (*G. polycephalum*)	W	G	Dr Op Sd, Thick	Ava (IK), Peer (FF), St Har (FF), Cr I (FF, JMF)
G. purpureum L.	W	G	Dr Op Sd	Ava (RRD), Peer (WS), St Har (FF, CSW)
Iva frutescens L. var. oraria (Bartlett) Fern & Grisc. (*I. oraria*)	R	Ma	Sal Mar	Ava (FF, JMF, HS), Peer (SB), St Har (RRD), Cr I (FF)

Species	Range		Habitat	Localities and Collectors
	NA	NJ		
Ambrosia artemisiifolia L.	W	G	Dr Op Sd	Ava (FF, JMF), St Har (FF)
Xanthium italicum Moore	W	In	Dr Op Sd	reported by O. Brown
X. echinatum Murr.	W	Ma	Beach, Sd Dune	Peer (FF, FWP), St Har (FF, SSVP)
Helianthus giganteus L.	W	CP	Sal Mar, Fr Mar, Dr Op Sd	Ava (FF, JMF), Peer (FF, SSVP), Cr I (FF, JMF)
Coreopsis lanceolata L.	W	In	Dr Op Sd	Ava (BL), Peer (FF)
Bidens discoidea (T. & G.) Britton	S	CP	Swamp	reported by O. Brown
B. frondosa L.	W	CP	Swamp	St Har (FF)
B. connata Muhl.	N	CP	Fr Mar	Ava (FF), Peer (FWP)
B. bipinnata L.	S	CP	Open Wood	Ava (FF)
B. coronata (L.) Britton	S	G	Fr Mar	Peer (WS), St Har (WS)
Achillea Millefolium L.	W	In	Dr Op Sd, Thick	Peer (FF) St Har (FF, WB)
Chrysanthemum leucanthemum L. var. pinnatifidum Lecoq & Lamotte	W	In	Dr Op Sd	St Har (FF)
Artemisia Stelleriana Bess.	N	Ma	Sd Dune	Ava (FF, JMF)
Erechtites hieracifolia (L.) Raf.	W	G	Thick	Peer (FF, FWP), St Har (FF)
Cirsium spinosissimum (Walt.) Scop.	N	CP	Woods, Dr Op Sd	Ava (Clarke), Peer (FF, WS)
C. discolor (Muhl.) Spreng.	W	CP	Dr Op Sd	Peer (FF)
Krigia virginica (L.) Willd.	W	G	Dr Op Sd	Ava (Clarke, SSVP), Peer (FF)
Hypochaeris radicata L.	R	In	Dr Op Sd	Peer (FF)
Taraxacum officinale Weber	W	In	Dr Op Sd	Peer (CK, FF)
Lactuca canadensis L.[1]	W	CP	Dr Op Sd	Ava (FWP), Peer (FF, FWP)
L. c. var. integrifolia (Bigel.) Gray	S	CP	Dr Op Sd	Peer (WS), St Har (FF)
L. hirsuta Muhl.	W	CP	Dr Op Sd	Ava (JBB), St Har (Jahn)
Prenanthes serpentaria Pursh	S	PB	Woods	Peer (FF, FWP, WS)
P. trifoliolata (Cass.) Fernald	N	CP	Woods	reported by O. Brown
Hieracium venosum L.	W	G	Woods	Peer (WS)
H. scabrum Michx.	W	CP	Woods	reported by O. Brown
H. Gronovii L.[2]	S	G	Dr Op Sd	Ava (JBB), Peer (FF, WS)

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University of Pennsylvania

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[1] Recorded in Stone (4) as *L. sagittifolia* Ell.

[2] Recorded in Stone (4) as *H. marianum* Willd.

New Stations for Lophotocarpus spongiosus in Southern New Jersey

J. W. Adams

The recent explorations by Dr. John M. Fogg, Jr., and Mr. Bayard Long along the Delaware River have shed light on the distribution of a number of native species once considered rare in southern New Jersey and in one case unknown. Two outstanding examples are *Lilaeopsis chinensis* (L.) Kuntze and *Lophotocarpus spongiosus* (Engelm.) J. G. Sm.

Since its first discovery along the Delaware River, *Lilaeopsis chinensis*[1] has been found at so many stations and in such abundance that now it is considered common along the brackish tidal marshes.

In 1936 Dr. Fogg records the first substantiated addition of *Lophotocarpus spongiosus*[2] to the flora of southern New Jersey. This present note places on record two more of what may eventually become a series of stations paralleling those of *Lilaeopsis chinensis* in frequency.

On June 17, 1937 the Torrey Botanical Club made a field trip to study the tidal vegetation along the Delaware in Salem County. The writer while riding in the company of Dr. Fogg, who acted as guide, and Miss Flora S. Fender noticed along the exposed tidal mud, 2.5 miles southwest of Salem, plants suggesting *Lophotocarpus*. Since it was decided best not to stop at the time, the return trip was made by the same route. Examination proved the plants to be a colony of *Lophotocarpus spongiosus* in all its leaf-shapes and plant sizes. While most of the plants were in full bloom, a great number still had quite young flower-buds tightly nestling among the leaves; other plants were young and immature: these indicated that the colony had from days to weeks more of anthesis.

There was a conspicuous absence of other more fully developed plants, there being only a few clumps of *Peltandra virginica* and young plants of *Ranunculus sceleratus* growing nearby. On the mud at the bases of some of the *Lophotocarpus* were tangled mats of *Spirodela polyrhiza* abandoned by the receded tide.

Between the time the above mentioned station was observed and our return to it Dr. Fogg and the party found another locality which had as fine a display of the *Lophotocarpus* as could be expected anywhere. On an extensive tidal mud flat, behind the shore of the Delaware River at Elsinboro Point, 4 miles southwest of Salem, were countless plants in bloom. It is safe to say there were acres of them.

The plants in general appeared to be more fully developed than those of the previous locality, both in size of the plants and in their stage of bloom. This species dominated that particular mud flat at the time. As before, the two associated plants were *Peltandra virginica* and *Pontederia cordata* with *Baccharis halimifolia* along the margin.

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[1] Bartonia 16: 51. 1934.

[2] Bartonia 17: 21. 1935.

One seeing such an impressive abundance of a plant, once unknown to southern New Jersey, cannot help but wonder, as suggested in the first paragraph, how much more of it is yet undiscovered. It also brings to mind the fact that while concentrated effort was being made to explore the Pine Barrens by local (and distant) botanists, Salem and Cumberland counties, and especially along the Delaware, seem to have been neglected. Anyone at all within the area of this plant, from the middle of June until frost, could not possibly have overlooked such an abundantly conspicuous display of it.

Specimens of *Lophotocarpus spongiosus* from both stations were collected and distributed to the following herbaria: *J. W. Adams* No. 3309, University of Pennsylvania, Philadelphia Botanical Club, Gray Herbarium, University of Montreal, Dr. Walo Koch in Zurich, Switzerland; *J. W. Adams* No. 3296, Gray Herbarium, University of Montreal, Dr. Walo Koch; *John M. Fogg, Jr.* No. 11,890, University of Pennsylvania, Philadelphia Botanical Club.

MORRIS ARBORETUM OF THE UNIVERSITY OF PENNSYLVANIA

A Locality for Hierochloe odorata in Pennsylvania

STANLEY L. GLOWENKE

On May 18, 1937, I visited the plateau area in the vicinity of Ararat, Susquehanna County, on which Ararat and Sugarloaf Mts. form impressive and conspicuous features. My purpose was to collect *Kalmia polifolia* and *Andromeda glaucophylla* on the quaking bog at Ball Lake and *Orontium aquaticum* at Dunns Pond.

Going along the roadside to Ball Lake I could not fail to be impressed by the belated appearance of the early Spring plants, which were here approximately three weeks behind the flowering period for the same species in the Susquehanna River valley. Traversing the woods to Ball Lake, in which *Claytonia caroliniana* and *Dicentra canadensis* ran riot, I encountered *Ribes glandulosum* Grauer, well known from the Pocono Plateau but previously unnoticed from this area. The bog also differs from those of the Poconos in lacking the dense thicket-growth of *Rhododendron* on its margin, as well as in the absence of *Picea mariana* and *Larix laricina*. Signs of a retarded Spring were further observed here, with *Kalmia* and *Andromeda* still in bud and *Eriophorum spissum* Fernald only beginning to show its silvery white heads. The bog was still in the grip of winter and very different from its appearance in mid-summer, when it is occupied by the orchids *Habenaria blephariglottis, Pogonia ophioglossoides* and *Calopogon pulchellus* and by the solid yellow masses of *Utricularia cornuta* with its fragrant exotic perfume.

Quitting the bog I proceeded on the second leg of my journey which led to Dunns Pond, the home of *Orontium.* Here I was more fortunate and collected in flower this interesting arum, whose naked golden spadices dotted the margin of the lake in abundance.

The knob of Sugarloaf Mt., a short distance away, enticed me into attempting further exploration. Making my way up the slope in a northeasterly direction, I again encountered the unadvanced stage of the vegetation and, considering it useless to ascend farther, retraced my steps in a southerly direction. Gradually the woods thinned out to a scattering of Large-toothed Aspen and Grey Birch with *Danthonia spicata* underfoot. Now my eyes were attracted by a grass unlike any I had seen before, occurring in the clearings here and in the apple orchard and meadow and below, covering in all an area of about five acres. Plucking a few stalks I noticed the pleasant aromatic odor, which enable me tentatively to identify it as Holy Grass. Further identification at home enabled me to confirm this fair guess and to realize that I had discovered *Hierochloe odorata* (L.) Beauv., previously unknown to the flora of northeastern Pennsylvania.

Sufficient has been said to convey a reasonable impression of the northern and coastal elements in the flora of this plateau, which has as outstanding examples the following species: *Polystichum Braunii, Potamogeton obtusifolius, Habenaria hyperborea, Listera cordata, Malaxis brachypoda* (Gray) Fernald, *Arethusa bulbosa, Myriophyllum tenellum, Polemonium Van-Bruntiae,* several stations for *Viola Selkirkii* and *Lobelia Dortmanna,* another station for *Orontium aquaticum* (in addition to the one described above) and other plants of lesser rarity. Several of the group find their southern limit here, while others proceed with scattered distributions to find their southern limits on the Pocono Plateau or in Pike County.

Hierochloe odorata constitutes a distinguished addition to the above list. Although well known as a rarity along the Atlantic coast to Cape May County, New Jersey, with stations up the Delaware River in Cumberland and Salem Counties, its inland distribution appears to be far more limited. Hitchcock's "Manual of the Grasses of the United States" does not list it from Pennsylvania, nor is material from there to be found in any of the larger herbaria; it thus makes an interesting addition to the flora of the state.

A specimen of this collection (*Glowenke* No. 146) is being deposited in the herbarium of the University of Pennsylvania.

Juncus Roemerianus in Talbot County, Maryland

Elizabeth C. Earle

While collecting along the shore of Long Point in Talbot County, Maryland, on May 30, 1937, I came upon a stand of what proved to be *Juncus Roemerianus* Scheele. It was growing in a narrow strip of yellow sand and clay along the edge of Hunting Creek, with its roots and long rhizomes probably well submerged by the brackish water at high tide. The spot was somewhat protected, since it faced southeast with a wooded bank behind, and was well away from the rougher water of the Miles River close by. This locality is 5½ miles west of Easton.

Although in the 7th edition of Gray's Manual the range of *Juncus Roemerianus* is given as " N. J. to Fla. and Tex.," Dr. Witmer Stone, in his " Plants of Southern New Jersey,"[1] emphasizes the fact that the reported occurrence of the species in New Jersey is open to very grave doubt and recommends that it be expunged from the flora of the state.

The plant has long been known from Sussex County, Delaware, where it was collected in the brackish marshes along the Indian River by Albert Commons in 1875. Other collections southward on the Delmarva peninsula have been made on Assateague Island, Accomac County, Va. and Old Town Neck and Magotha, both in Northampton County, Va.

The only published record of the species from Maryland appears to be that of Shreve,[2] based on a specimen collected by Dr. M. A. Chrysler on St. Georges Island, St. Marys County, which is on the western shore of the Chesapeake Bay. There seems to be no evidence that the plant has ever before been collected on the " eastern shore " of Maryland, so that the locality near Easton stands out not only as establishing a new northern limit for this rush but as constituting its first record from peninsular Maryland.

A specimen of the above collection (Earle No. 1467) has been deposited in the herbarium of the University of Pennsylvania.

Populus heterophylla in Southern New Jersey

J. W. Adams

One of the rarest trees in southern New Jersey is the Swamp Cottonwood or Downy Poplar, *Populus heterophylla* L., which is common along borders of river swamps in the southern states and the Mississippi valley. Along the Atlantic States it extends from Connecticut to Georgia, being rare and local in the northern portions of this range. In New Jersey this species has been listed in

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[1] Report N. J. State Mus., footnote p. 330, 1910.

[2] Plant Life of Maryland. Maryland Weather Service, 415, 1910.

Mr. Norman Taylor's Flora of the Vicinity of New York[1] as occurring in "Bergen, Hudson, Middlesex and Cumberland counties, not common; also at Cape May Court House."

Dr. Witmer Stone in his Plants of Southern New Jersey[2] says "known only from one tree, found by Mr. Albert Commons, July 27, 1880, on Fortesque Beach." He has seen a specimen in the Herbarium at New Brunswick labeled "low woods on Delaware Bay, June 27, 1880" which forms a basis for his record and apparently for the citation in Dr. N. L. Britton's Catalogue of the Plants found in New Jersey.[3]

Until 1911 the Fortesque Beach station was the only one known for southern New Jersey. On August 13, 1911, Mr. Bayard Long discovered a second station along the Coast Strip bordering the brackish marshes below Cape May Court House, Cape May County.[4] No others have been found since.

A third station was found on June 21, 1935 by the writer while riding with his wife and Dr. John M. Fogg, Jr. to collect along the Delaware River at Sea Breeze. As we passed along the road cutting through the swampy woods and thickets, about 2 miles east-southeast of Lanings Wharf, Cumberland County, several trees were noticed which had a none-too-familiar look. After we had finished collecting along the river we returned by the same route and stopped to examine the trees carefully. They turned out to be the *Populus heterophylla* for which local botanists had been seeking additional stations for some time.

The present station is a comparatively short distance from Mr. Commons' locality. There is every reason to believe that more stations for this species will be found as botanists collect in this little-explored region of the state.

The trees at Lanings Wharf locality were about 20–25 feet tall, forming a small grove in the open margin of the swampy woods. At the time the roots were under several inches of water. That the water at the spot was permanent was evidenced by the fact that within the shadow of the trees was a fairly broad pool, about a foot or so deep, in which grew *Potamogeton* sp. with entirely submerged and floating leaves, while almost under water, near the margin, were colonies of *Proserpinaca palustris*. The other nearby trees and shrubs, typical of southern New Jersey deciduous swamps, were mainly *Acer rubrum* var. *tridens, Magnolia virginiana, Ilex verticillata,* etc.

Herbarium specimens in duplicate were collected as well as living root-sprouts for the Morris Arboretum tree collections. At the time of writing the sprouts have grown over 4 feet tall. The herbarium specimens cited, together with their distribution, are as follows: *John M. Fogg, Jr.*, No. 8800, University of Pennsylvania, Gray Herbarium; No. 8801, University of Pennsylvania, University of Missouri, Field Museum; *J. W. and Myrtle T. Adams*, No. 2037, Morris Arboretum, Philadelphia Botanical Club, Arnold Arboretum, U. S. National Herbarium.

MORRIS ARBORETUM OF THE UNIVERSITY OF PENNSYLVANIA

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[1] Mem. New York Bot. Gard. 5: 262. 1915.

[2] Ann. Rep. New Jersey State Museum for 1910: 391. 1911.

[3] Geol. Surv. New Jersey 2: 227. 1889.

[4] Bartonia 4: 16. 1911.

Occurrence and Seed Production of Froelichia floridana

STANLEY L. GLOWENKE

In the Spring of 1935 I was informed by a friend that *Froelichia floridana* (Nutt.) Moq. grew in abundance along the Laurel Line, an electric railroad running between Scranton and Wilkes-Barre. My interest was naturally aroused on hearing that this southern species occurred in northeastern Pennsylvania. On July 30 of that year I had the first opportunity of visiting the locality, which exists on the old slag heaps of the blast furnaces, at the Waldorf station of the Laurel Line on the eastern edge of the city.

The plant literally overruns an area of about an acre, undoubtedly finding the dry neutral or slightly alkaline soil, resulting from the weathering of the slag, much to its liking. It is the most conspicuous and dominant plant found here, its woolly seed clusters on wand-like stems making an attractive if strange sight.

Froelichia floridana appears first to have made its appearance in 1919, when it was observed by Mr. R. N. Davis, Curator of the Everhart Museum, associated with *Eragrostis minor* Host. (*E. poaeoides* Beauv.) Probably introduced by the Erie Railroad during the war, when so many weeds were acquired from other countries, it has spread to a locality on the Laurel Line at Rocky Glen near Moosic, five miles south of Scranton, where it is restricted to a small colony on a railroad siding.

Several plants were collected for the herbarium of the University of Pennsylvania and others were planted in the garden, where they did very well despite the fact that the site was damp and shaded. Precautions were taken to prevent the species becoming a weed, as it appeared likely to adapt itself to a variety of conditions. One individual did manage to seed itself in a sunny situation, where it grew into a lush bushy plant with most of its fleshy arms in a lateral position on the ground.

The species has a long flowering period: from about the beginning of July to the first killing frost. As the weather grew colder I noticed that the young seeds, which are covered by a thin scale, had changed from the usual light buff color to black. Examining a few of them, I noticed that the rudimentary floral organs which serve the plant in producing self-fertilized seeds were completely absent. The plant in response to the physiological effect of a drop in temperature and diminished sunlight had dispensed with even these vestiges of a perianth and was hurrying to produce its crop of seeds before cold without them! We seem to have here an analogy to the cleistogamous flowers of *Dalibarda repens* and *Viola spp.* or the adventitious buds of *Cystopteris bulbifera.* This behavior may portray an evolutionary trend of *Froelichia* or possibly show its adaptability to meet a variety of conditions.

Lepidium perfoliatum in the Philadelphia Area

RODNEY H. TRUE

On May 8, 1937, I noticed several plants of a small crucifer, unknown to me, growing along the cinder road near the greenhouses at the Morris Arboretum in Chestnut Hill, Philadelphia County, Pa. A specimen collected on this date was submitted to Dr. John M. Fogg, Jr., who identified it as *Lepidium perfoliatum* L., a European species rarely seen in this vicinity.

The herbarium of the Philadelphia Botanical Club contains no material of this plant and the only evidence we have of its previous occurrence in the Philadelphia area is a sheet in the herbarium of the University of Pennsylvania collected by Isaac Burk at Kaighn's Point in Camden County, New Jersey. Burk's specimen bears no date or habitat, but was presumably collected on ballast more than fifty years ago.

Material of the present collection has been deposited in the herbarium of the University of Pennsylvania.

A Third Station in Pennsylvania for Potentilla tridentata

IDA K. LANGMAN

On July 5, 1936, I visited Cresco Heights in Monroe County to collect plants that might have escaped my attention on previous trips, late the preceding summer. There, on the exposed red shale of the summit, I discovered *Potentilla tridentata* Ait. in full bloom. The white flowers, which had been absent on the dates of my other visits, now made an attractive show. The three-parted leathery leaves, with their slightly lobed leaflets, trailed in profusion over the ledges. Although the area covered by the plant was not large, it was quite exposed and it is difficult to understand how all those who have collected in this region, myself included, had overlooked it, especially since the locality is so accessible and so well known.

Potentilla tridentata has previously been reported in Pennsylvania from but two stations: Bald Mount in Lackawanna County and Penobscot Knob in Luzerne County. The new station at Cresco Heights is at an elevation of 1730 feet and is located just west of, and between, Cresco and Mountainhome, in Barrett Township, Monroe County. Here, on the rather dry summit, it is associated with such plants as *Arenaria groenlandica, Prunus depressa* and *Stenophyllus capillaris,* while on the wet ledge crevices below are *Woodsia ilvensis* and *Ranunculus fascicularis.* Specimens of all of these species have been deposited in the herbarium of the University of Pennsylvania.

To have added a new station in Pennsylvania for this attractive little northern *Potentilla* is indeed gratifying. To collectors who may visit the locality my only suggestion is that specimens be taken sparingly; the stand is quite limited and should not be disturbed.

More Unpublished Works of Schweinitz

F. W. Pennell

Recently, in investigating the contents of some long-closed boxes in the Botanical Department of the Academy of Natural Sciences my assistant, Miss Grace M. Tees, chanced upon a series of record-books all dating from before the present century. Most imposing among these was a huge yellow ledger, which contained entries in the handwriting of Lewis David von Schweinitz. It was given no title by him, the legend " Record Book " which appeared on its back having presumably been its sales-name as a blank-book. The volume proved to be a catalogue of Schweinitz' entire herbarium, evidently his master check-list which had accompanied the herbarium to this institution in 1834. Its records cover all groups of plants, listing (and numbering) genera and species, and for each species citing countries and collectors. While largely duplicating the abbreviated records on Schweinitz' herbarium sheets, the latter data will supply some additional records and also afford welcome verifications of his difficult handwriting. At the beginning is a special list of 108 " Contributores," which yields more than 40 names additional to those concerning which Dr. Barnhart recently gave us a report. This catalogue is a find of first importance.

More interesting still is a manuscript found packed within the front cover of the huge book. It is entitled " Synopsis Plantarum Americanarum," and proves to be a Flora, all in Latin, giving descriptions of genera and species, with brief statements of occurrence, for flowering plants and ferns. Here are the accounts of the many species which Schweinitz had intended to describe as new, the names for which are so often encountered in the Academy's herbarium. The work is on the Linnean arrangement. Its publication would once have been a valuable contribution to American botany, and we can only regret that a study of such scope should have been stored away and forgotten.

It is also to be regretted that its discovery did not occur in time for consideration in our recent account of the botanical work of Schweinitz.[1]

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[1] Bartonia 16: 1-36. 1935.

An English Obituary Account of Thomas Nuttall

F. W. PENNELL

Just after the publication of the "Travels and Scientific Collections of Thomas Nuttall" in our last issue of Bartonia, I received from Dr. W. L. Jepson of the University of California a copy of a wholly unsuspected contemporary sketch of the botanist. Dr. Jepson's health had not permitted him to respond to my early request that he would prepare for Bartonia some account of Nuttall's far western travels, but what he sends, incomplete as it unfortunately is, turns our attention to a new source of information about the botanist.

In the files of biographic separates at Kew Gardens in England Dr. Jepson found an article on "Mr. Thomas Nuttall, the Naturalist," which soon after Nuttall's death had appeared in the "Settle Chronicle and North Ribblesdale Advertiser." Settle is a town on the River Ribble in extreme west Yorkshire, close to Long Preston where Nuttall was born and adjacent to the portion of Lancashire where his last years were spent. We have more than local color in the article, however. We have intimate knowledge of Thomas Nuttall, both personally and scientifically, for the article was by T. J. Booth, Nuttall's nephew and himself a botanical collector.[1] Booth was evidently in India at the time of his uncle's death, for this was said to have been due to overstrain in opening a box of his nephew's shipment. That some months elapsed before the preparation of Booth's sketch is evident, not only from the fact that the latter must needs first return from India, but also because Booth obviously drew from Durand for Nuttall's American experiences. It is on the English background that Booth supplies needed light.

For Nuttall's early life it is well to quote Booth's account fully, as this picture has never before been presented to American readers:

> "THOMAS NUTTALL, F.L.S., etc., etc., whose history is the subject of this memoir, and whose recent decease is a subject of regret to many of his numerous relatives and friends, was born of humble parentage in the year 1786, in the village of Long Preston, in Craven, in the West Riding of Yorkshire. At the age of 12, he and two younger sisters were left to the care of their widowed mother, who, through the wastefulness of their unfortunate father, was nearly left in poverty. Our naturalist at this village merely obtained an ordinary English education at the Grammar School of the Parish; and at the early age of 14 was indentured for 7 years to the art of book-printing with his paternal uncle Jonas Nuttall Esq., of Liverpool, at that time well known throughout many counties of England as a publisher and

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[1] Bartonia 18: 43. 1936.

vender of books in small periodical parts, so as to meet the abilities of the poorer classes of society, and afford them at an imperceptible rate the means of useful information. In this situation, however, urged by necessity, our naturalist had scarcely any opportunity for the development of that talent for which he has since been successfully known. He now began to feel the want of a superior education, and every leisure moment was assiduously employed in the acquisition of classical learning, and with no other opportunity than occasional rehearsals to his better educated fellow apprentice, the nephew of the celebrated Commentator, Dr. Adam Clark, he found means to become acquainted with the usual Latin Classics, and afterwards read the Greek Testament, and even the Persian Grammar of Sir Wm. Jones, he also acquired in the same way a tolerable reading acquaintance with the French. These however appeared to be only preliminary to the taste for Botany and Natural History which he had now acquired; the mere system of Linnaeus had not however much attraction for him, confined as he had long been to an arduous trade; and though very partial to the cultivation of a small garden, nature on a grand scale had never come within the scope of his contemplation; and like the insect fluttering from flower to flower, he had cultivated the knowledge that came within his narrow sphere merely for its sake, without as yet meeting with anything steadily attracting. At this period, about the age of 18, the severity of labour and study to which he was devoted began sensibly to prey upon his health, and his uncle permitted him to retire for a while to the air of his native village. On this occasion he became acquainted with Mr. John Windsor of Settle, since eminent as a successful medical practitioner in Manchester, and F. L. S. etc., who then cultivated the study of Botany with great avidity, and to whom our friend at length dedicated a genus of North American Grasses. With Mr. Windsor, whom he ever remembered with gratitude, and whose friendship endured to the end of his life, he now for the first time made a botanical excursion over the cliffs and romantic hills of Settle, and ascended Pennyghent and Arncliffe mountains, on which many rare and curious Alpine plants are known to grow. Here then on his native alpine hills he for the first time felt the enthusiasm of the naturalist.

"At the age of 21 expired the term of servitude which had shackled the ardour of our friend in the pursuit of his favourite science; and, now at liberty, he embarked for the United States of America with the hope of earning a livelihood by his trade, and of having leisure at intervals to examine the natural history of that vast and interesting country. Before leaving Liverpool he sought in vain to obtain any distinct work on any branch of the natural history of that country, in fact as such there then did not exist anything more than small essays on separate parts of the productions of the vast territories of the United States."

Then, we hear in Nuttall's own words his impressions on sailing up Delaware Bay and River. Next, after his arrival at " the city of Philadelphia, so remarkable for its neatness and appearance of opulence . . . instead of seeking a lodging and place of subsistence, [he] walked eagerly through the city, passed the river Schuylkill, and proceeded 6 or 7 miles on the road to Lancaster, admiring and collecting every curious plant which fell in his way, till, checked by a dark thunder storm, he returned to the city reluctantly. . . ."

> " His small stock of money however was expended before he could get employment as a printer, and debt, to which he had been a stranger, soon discovered to him that in America he was far from home; but at length, gaining employment, he was enabled to save something from his earnings, and occasionally to find time for botanical excursions in the vicinity of Philadelphia. Soon after his arrival, calling on the late Dr. Barton, then Professor of Materia Medica and Natural History in the vicinity of Pennsylvania, he purchased from him his Elements of Botany, by the assistance of which, and his personal acquaintance, he at length became pretty well acquainted with the plants of the neighbourhood. And in the summer of 1808,[2] by desire of Professor Barton, he made an excursion to the mountainous [*sic*] part of Delaware, Sussex County, and by the assistance of Michaux's Flora, acquired a knowledge of most of the curious plants which he met with in his walks, and found no inconsiderable number of those species which had hitherto been supposed alone indigenous to Carolina and Virginia. The hospitality of the inhabitants, to some of whom he had letters of introduction, proved so favourable to his limited finances, that on his return, highly gratified with success, he declined receiving from Dr. Barton the defrayment of his expenses.
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> " At a later period of the same summer he found means from the savings of his industry to pay a visit to the grand Cataract of Niagara, the greatest part of which journey he performed on foot, crossing the mountains of Pennsylvania at Wilkesbane [Wilkes-Barre], and so proceeding by Canandagua and Buffalo to Niagara, everywhere collecting objects of natural history, particularly for Professor Barton, who again also furnished him with letters of introduction.
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> " But at Ancaster in Upper Canada he fell ill of a bilious fever then prevalent, and was confined about a month by the first sickness almost he had experienced in life, the kindness and hospitality however of strangers never forsook him, and hope and a good constitution soon raised him to his wonted exertions."

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[2] This and the Niagara trip were actually in 1809, as proved by dated letters to Barton. See Bartonia 18: 6. 1936.

From this point on Booth seems to have built the remainder of the first part of his account of Thomas Nuttall upon Durand's sketch, so that it no longer has the value of a source.[3] This part, the only one preserved at Kew as I am informed in a letter of this October from Mr. T. A. Sprague, leaves Nuttall in the midst of his career; it is subscribed: "To be concluded next month." Mr. Sprague, who knows the local situation in England, tells me that the remaining part ought to be in the British Museum Library (Bloomsbury), but warns me that the finding of it "would be a long job, and we do not know whether any continuation was actually published." It would likely be a costly search. So, for the present we must rest content with what we have, although well aware that it is the second part which would tell of Booth's own knowledge of his uncle, giving us direct information of his estate and life at Nut-Grove Hall.

But what we have quoted above fills in needed detail of Nuttall's youth. It shows us his industry as a scholar, giving him the knowledge of Latin and Greek evident in his later work. And it shows the beginning of his botanical interest, developed in friendship with Dr. John Windsor.

Booth's sketch further shows that there is one important correction to be made to my account of Nuttall a year ago. On page 2 I passed on without hesitation the statement that Thomas' father was Jonas Nuttall, the printer, whereas the latter proves to have been Thomas' uncle. On page 41 I gave the close family relationship as my reason for accepting F. R. Dixon-Nuttall's statement that "Jonas and Thomas Nuttall were my father's uncles," and so that Thomas received Nut-Grove Hall from his brother Jonas. But the contemporary evidence of both Meehan's informant and Durand was that the estate had come from Thomas' uncle, whom they left unnamed. Now, Booth's account shows that Thomas had no brothers. The problem, however, is easily solved with evidence from both sources. Meehan's informant and Durand were right as to the relationship, but Dixon-Nuttall was right as to the name. The estate must have come to Thomas from his *uncle* Jonas Nuttall. To no one else would Thomas Nuttall have felt so indebted as to this uncle who had helped him in the days of his youth. One can understand why the binding inheritance of Nut-Grove Hall could hardly be refused.

[3] Here may be inserted a slight geographic correction to page 9 of last issue. "Michilimakinak" of Nuttall's time, as I learned on a visit to the strait last June, was wholly the present Mackinac Island, where was the old fort and trading center.

Joseph Crawford

WITMER STONE

I first met Joseph Crawford on one of those Sunday botanical excursions conducted by Dr. J. Bernard Brinton in the late eighties and early nineties. This particular trip, on May 18, 1890, was to Egg Harbor City in the heart of the New Jersey Pine Barrens. George M. Beringer and Dr. A. W. Miller were other members of the party, and I brought with me my boyhood friend Stewardson Brown, there introducing him to these men who were to become associated with him in later years at the Academy of Natural Sciences. This gathering was therefore of no little importance in local botanical history, for out of it came the formation of the Philadelphia Botanical Club.

Brown and Crawford immediately became fast friends and remained so until the death of the former thirty years later. For years Brown used to dine regularly with Crawford on Saturday evenings and they both attended evening gatherings at Dr. Brinton's home where the activities of the Club and the Botanical Section of the Academy were discussed and recent collections were studied.

Brown introduced Crawford and Dr. Brinton to the Susquehanna Valley at York Furnace where I had still earlier taken Brown, guided in turn by my uncle John S. Witmer and John B. Kevinski, original members of the Tucquan Club of Lancaster, an organization interested in natural history and fishing. This spot soon became one of the favorite collecting localities for this coterie of botanists, as the many specimens in the local collection at the Academy and a privately printed volume on York Furnace will testify. Influenced no doubt by members of the Tucquan Club the Old York Furnace hotel was a favorite summer resort for residents of Lancaster interested in nature and in beautiful scenery, and it was here on a later occasion that Crawford met Miss Mary Grace Hager of Lancaster who became his wife.

Along with Dr. Brinton, Thomas Meehan, Isaac C. Martindale, Uselma C. Smith, George M. Beringer, Stewardson Brown and the writer, Crawford attended a meeting at the Academy of Natural Sciences on December 1, 1891, at which it was decided to organize the Philadelphia Botanical Club, which was effected at subsequent meetings held on December 8 and 22. From the outset he was an active promoter of the Club and was elected its fourth president in 1898, a position which he filled until 1909. In 1908 Brown, Crawford and the writer were appointed a committee to plan for an annual publication, the first issue of which appeared in February 1909, under the name of " Bartonia."

Joseph Crawford was born at Audubon, Montgomery Co., Pa., on December 20, 1858, the son of Albert and Adelaide (Corson) Crawford. He received his early education at the Norristown High School, and later studied at the Philadelphia College of Pharmacy. After graduation he opened a pharmacy at Frankford Avenue and Hart Lane, Philadelphia, which he maintained until about 1908; then he became pharmacist at the Phipps Institute in the same city, a position from which he retired in 1934. His home in his later years was in Lansdowne, Delaware Co. He had two children, Joseph and Ann, the latter marrying Peter van Santen Kolff. Crawford died on October 24, 1936 and his widow shortly after.

Joseph Crawford's early inclination to botany was fostered by his course of study at the College of Pharmacy where he became intimately associated with George M. Beringer, a man of kindred interests in pharmacy and botany. Crawford formed an extensive local herbarium, which was eventually presented to the Academy of Natural Sciences.

Crawford visited Florida in 1897, Florida and Georgia in 1922–23, and Georgia in 1926. In 1910 in company with Dr. Amos P. Brown, Stewardson's brother and professor of geology in the University of Pennsylvania, he visited Jamaica and Panama. All of these trips yielded collections of value, which were always presented to the Academy.

Crawford's chief interest was ever the plant in the field and, although he made little critical study of his material, he acquired a broad knowledge of the field characters of the plants of eastern North America. So far as I can ascertain, his publications are limited to a paper on "Some Sand Dune Plants from Longport, N. J." (Bartonia 1: 18–19. 1909.) and to the list of the plants of York Furnace in the privately printed volume already referred to, which was largely his work.

Thomas J. Oberlin

HANS WILKENS

Thomas J. Oberlin (Oberly) of Berks County, Pennsylvania, died November 12, 1936, at the age of 86 years. He was born at Shaefferstown, Lebanon County, in 1850; and he was educated in the local schools, and at Palatinate and Ursinus Colleges. From 1868 for a few years he taught a country school near Epler's Church, west of Tuckerton, Berks County.

In 1872 Mr. Oberlin went to Elkhart, Indiana, and there, following the suggestion of John H. Redfield, he made his first collections of plants. He soon returned to Pennsylvania and during the next three years lived at Womelsdorf, from which he made collections in western Berks and eastern Lebanon counties.

About 1876 Mr. Oberlin married, and in that year he moved to Sinking Spring, Berks County, where he resided for the remainder of his long life. For the first fifteen years he conducted in his home a private school, Charter Oak Academy. During his later years he was in business as a florist, specializing in cut flowers and in the propagation of tree peonies and lilacs. At the time of his death he and his son conducted the "Oberlin Peony Gardens."

It was during the first fifteen years of his life at Sinking Spring that Mr. Oberlin was most active as a student of the local flora. He collected in the country between Sinking Spring and Reading, and south as far as Gouglersville. His herbarium contains a few specimens gathered on visits to Linfield and Limerick, Montgomery County, to Mauch Chunk, Carbon County, and Penryn Park, Lebanon County. None of his specimens bear a date later than 1889. During this time he spelled his name "Oberly." On the labels of the specimens in his own herbarium this has been corrected to "Oberlin," and later printed labels bear that form of the name.

Many of Mr. Oberlin's collections were made in company with Dr. Daniel B. D. Beaver, a dentist of Reading. Dr. Beaver contributed a list of the plants of the county to a "History of Berks County in Pennsylvania, by Morton L. Montgomery, 1886." This list was based on Oberlin's collections, but to them were added the names of a number of specimens in Beaver's own herbarium, some from New Jersey, others altogether without data.[1]

From 1877 to 1882 Mr. Oberlin exchanged specimens with a number of collectors, especially Gustavus Guttenberg of Wheeling, W. Va.,[2] Rev. Joseph Blake of Gilmanton, N. H., Benjamin Preston Clark of Boston, Mass., L. M. Underwood of Bloomington, Ill., and George D. Butler.[3]

Both the herbaria of Mr. Oberlin and Dr. Beaver are now at the Reading Public Museum. The Oberlin Herbarium, acquired in 1931, consists of 1500 mounted sheets and a large quantity of unmounted specimens. His specimens are well named, according to the editions of Gray's Manual in use at the time. The grasses had been studied with especial care.

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[1] Such as *Schizaea, Polygala cruciata* and *P. lutea, Hudsonia* (both species), *Gaylussacia brachycera, Viola palustris, Lathyrus pratensis,* etc., species not occurring in Berks County.

[2] Most of Oberlin's specimens in Dr. T. C. Porter's Herbarium, now at the Academy of Natural Sciences of Philadelphia, were sent by Guttenberg, although a few were contributed directly. Among these was the only specimen found of *Pogonia affinis.*

[3] Others from whom specimens were so received are E. A. Bigler, Auburn, Ill.; Mrs. Kate Cunningham, Blairsville, Pa.; H. F. Jaeger, Chicago, Ill.; H. N. Patterson, Oquawka, Ill.; George L. Smith, Baltimore, Md.; and Harriet M. Willmarth, Philadelphia, Pa. and Pemberton, N. J.

Reviews

Two Fern Books

The ferns and fern-allies of the area covered by the Philadelphia Botanical Club have been treated in two recent works, which may well be reviewed in contrast with one another. Small's "Ferns of the Vicinity of New York"[1] is a volume of 285 pages, printed in small type, with very wide margins, so that it approaches standard octavo size. Most of the ninety species treated are illustrated by full-page line drawings, intended to show not only the aspect of the plant and the cuttings of the frond, but also to emphasize critical characters such as the arrangement of the veins and the nature of the sori. Many of these illustrations are excellent; a few, by showing only a portion of the frond, convey a very inadequate impression of the appearance of the species.

The author has provided a complete series of keys to families, genera and species. It is to be regretted that once the user has identified his plant as to family he can not next "run it down" to its genus, but must needs go through the intermediate step of assigning it to its correct tribe. Even the generic keys in some genera (*Asplenium, Dryopteris, Botrychium, Equisetum*) require reference to the section before arriving at the species. Such a practice must surely prove discouraging to the beginner and adds little to the enjoyment or knowledge of the technical student. Furthermore, through an unfortunate oversight, the serial numbers given to the genera in the keys to the tribes Dryopterideae, Woodsiae, Davallieae and Onocleae do not correspond to the numbers assigned to those genera in the main body of the work. A glossary is appended of those terms utilized in the keys and in the text, but here it must be objected that many of the definitions are deplorably short and uninstructive. It is doubtful, for instance, whether anyone not already familiar with the use of the term "dimorphic," as applied to fern fronds, will receive proper enlightenment from the mere definition, "Occurring in two forms."

Under each species is given a brief technical description, together with a popular account in which history, range, variations and behavior under cultivation are discussed. An interesting feature of the work is the effort made to refer each species to the floral area or areas in which it is best represented. In this manner attention is focussed upon the rôle which rocks and soils play in determining or influencing distribution and emphasis is given to the great diversity of habitats included within the New York and Philadelphia local areas. Of added interest in this connection will be the inset map portraying the physiographic or botanical provinces found within the region covered by this book.

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[1] Ferns of the Vicinity of New York, by John Kunkel Small. Science Press Printing Co., 1935. $2.50.

Novel or unorthodox nomenclatorial procedures include the use of *Pteris* instead of *Pteridium* for the bracken, *Diplazium* in place of *Asplenium* or *Athyrium* for the silvery spleenwort and *Homalosorus*, a new generic epithet, for the plant conventionally known as *Athyrium angustifolium.* Although condemned by those who adopt a world view of fern classification, the practice is here followed of dividing the Shieldfern group into three genera. Thus, *Thelypteris* is used for the marshfern series, *Dryopteris* includes the woodferns, and *Phegopteris* is retained for the two beech ferns and the oak fern.

Wherry's " Guide to Eastern Ferns " is somewhat smaller, both in containing only 220 pages and in having the side margins so narrow that a real pocket-size volume has resulted. It is admittedly a popular work and numerous features seem likely to make it more useful to non-technical students than the book above discussed. Thus, it is printed in 10-point type, making the text much easier to read. It contains immediately after the introduction an elaborate glossary, in which the technical terms used are unusually fully defined. In place of keys there is given an outline of the features on which the standard classifications of ferns and fern-allies are based. Over 100 species are included, comprising all those known to grow in the Middle Atlantic States. For each species there is given, first, a line-drawing showing the complete frond outline, often accompanied by an enlarged view of a small portion to bring out cutting, veining, and sorus characters. On the page facing each drawing appears a condensed account of the species, systematically arranged under the headings History, Features, Habitat, Range, and Remarks. The nomenclature is more conservative than that of Small, who is followed only as to the splitting of *Dryopteris* into three genera. Varieties of species are freely recognized, but the varietal names are placed in parentheses, with the suggestion that they may be ignored by anyone interested primarily in the species. A common name is given for each species and variety, some of them being rather unfamiliar, but in general being descriptive of some feature of the plant, instead of the frequently used translations of the technical names. Finally, six pages of the book are devoted to the subject of Fern cultivation, with practical suggestions based on the writer's wide experience.

[2] Guide to Eastern Ferns, by Edgar T. Wherry. Science Press Printing Co., 1937. $1.00.

J. M. F.

General Notes

Death of George Redles. On January 20, 1937 died George Redles of Germantown, Philadelphia, for nearly twenty years a member of our Club. He was a keen field botanist, who gave special attention to the orchids. Several of our most interesting species of this family were brought to light by him, the most notable being *Habenaria integra*, of which his specimen of 1885 is the most recent collection from the old locality àt Quaker Bridge, N. J. For the last fifteen years of his life he was superintendent of Wister Woods, a wild-flower sanctuary in Germantown, and for 38 years he was Secretary of the Germantown Horticultural Society. A fuller appreciation of him, by our fellow-member, Samuel N. Baxter, appeared in the Germantown Telegraph for January 29, 1937.

Moving of the Academy's Herbaria. Thirty years ago the botanical collections of the Academy were contained in four rooms, on the ground floor and mezzanine at the southwest and northwest corners of the north building, rooms cut off from the library in such a way that the botanical books were between the halves of the herbarium. Twenty years ago the library had gone to its present quarters in the Academy's south building, while the herbarium occupied the ground and mezzanine floors at the east end of the north building, being the first landmark for all visitors to the institution. The Main Herbarium was on the ground floor; the Local Herbarium and cryptogamic collections on the mezzanine. Ten years ago the Local Herbarium was still in this location, but the Academy's newly formed office had forced the moving of the Main Herbarium, and with it the Cryptogamic collections, to the second floor and its mezzanine, at the east end of the north building.

Once again, this past spring, as part of a policy of expansion affecting the whole Academy, our herbaria have been moved. This time we have had allotted us nearly all the fourth or top floor of the Academy's middle building. This places our herbaria together on a single, instead of upon three floors, and with some increase of space. The cryptogamic collections now for the first time have a room to themselves. Most of all has the Local Herbarium benefited by the change, as there is adequate afternoon light (sadly wanting in its last location) and its specimens have been all transferred to modern metal cases.

Program of Meetings during 1936

Date	*Subject*	*Speaker*	*Attendance*
Jan. 23	Plant Hunting in Chile	Dr. Francis W. Pennell	19
Feb. 27	Survey of *Carex* in the Local Area	Hugh E. Stone	18
Mar. 26	The Piedmont Element in the Flora of Salem County, N. J.	Dr. John M. Fogg, Jr.	27
Apr. 23	Some Problems in *Solidago*	Prof. M. L. Fernald	40
May 28	Observations on the Flora of Seven-Mile Beach, N. J.	Miss Flora S. Fender	28
Sept. 24	Reports by Members on Summer Work		17
Oct. 22	Spring Botanizing in Northeastern Pennsylvania	Dr. John M. Fogg, Jr.	24
Nov. 19	Recent Explorations in Hunterdon County, N. J.	Bayard Long and W. M. Benner	30
Dec. 17	Travels and Botanical Collections of Thomas Nuttall	Dr. Francis W. Pennell	29

List of Officers and Members

JOHN M. FOGG, Jr., *President*
HARRY W. TRUDELL, *Vice President*
ROBERT R. TATNALL, *Secretary*
ARTHUR N. LEEDS, *Treasurer*
BAYARD LONG, *Curator*
FRANCIS W. PENNELL, *Editor of* Bartonia

ACTIVE MEMBERS

	Elected
J. W. Adams, 32 Pleasant St., Germantown, Philadelphia, Pa.	1925
A. G. Alderfer, Sellersville, Pa.	1932
Dr. Lewis E. Anderson, Dept. of Botany, Duke University, Durham, N. C.	1934
Edwin B. Bartram, Bushkill, Pa.	1906
J. Russell Bebler, 135 E. Phil Ellena St., Germantown, Philadelphia, Pa.	1919
Don M. Benedict, Dept. of Biology, Temple University, Philadelphia, Pa.	1932
Dr. Walter M. Benner, 5636 Loretta Ave., Frankford, Philadelphia, Pa.	1912
Jasper T. Bentley, 7334 Rural Lane, Mt. Airy, Philadelphia, Pa.	1933
Carl E. Bliss, 55 Randolph Place, South Orange, N. J.	1924
Mrs. D. N. Borodin, 2 Center Ave., Willow Grove, Pa.	1933
Carl Boyer, Wagner Institute, 17th St. & Montgomery Ave., Philadelphia, Pa.	1926
J. Claudius Boyle, 225 Kenmore Road, Brookline, Pa.	1919
Milton Campbell, 4401 Pine St., Philadelphia, Pa.	1928
Prof. M. A. Chrysler, Rutgers University, New Brunswick, N. J.	1931
F. Van Buren Connell, 443 Berkley Road, Haverford, Pa.	1924
Mrs. T. B. Dallas, The Belgravia, 1811 Chestnut St., Philadelphia, Pa.	1933
Dr. Kenneth D. Doak, 4414 Pine St., Philadelphia, Pa.	1934

	Elected
Robert R. Dreisbach, 806 Mill St., Midland, Mich.	1922
Leonard J. Duersmith, 511 Walnut St., Columbia, Pa.	1931
Miss Elizabeth C. Earle, 4209 Chester Ave., Philadelphia, Pa.	1935
Howard W. Elkinton, 6514 Germantown Ave., Philadelphia, Pa.	1931
Mrs. Edward W. Evans, 6014 Chew St., Germantown, Philadelphia, Pa.	1932
Mrs. Harold Evans, Awbury, E. Washington Lane, Germantown, Philadelphia, Pa.	1931
Richard Blossom Farley, 1828 Rittenhouse St., Philadelphia, Pa.	1931
Miss Flora S. Fender, 924 N. 26th St., Philadelphia, Pa.	1936
Dr. John M. Fogg, Jr., Dept. of Botany, University of Penna., Philadelphia, Pa.	1921
F. R. Fosberg, Dept. of Botany, University of Pennsylvania, Philadelphia, Pa.	1937
Fairman R. Furness, Media, Pa.	1935
Miss Bernice Gibble, 739 S. Highland Ave., Merion, Pa.	1936
Mrs. Howard L. Godfrey, 7413 Germantown Ave., Germantown, Philadelphia, Pa.	1935
Louis E. Hand, 8061 Fairview St., Holmesburg, Philadelphia, Pa.	1936
Arthur M. Henry, 416 New Post Office, Atlanta, Ga.	1927
Howard K. Henry, 1464 Drayton St., Penn Wynne, Pa.	1932
Mrs. J. Norman Henry, Gladwyne, Pa.	1932
Frederick J. Hermann, Dept. of Botany, University of Michigan, Ann Arbor, Mich.	1932
F. F. Huber, Pennsburg, Pa.	1911
Charles F. Jenkins, Kitchens Lane, Mt. Airy, Philadelphia, Pa.	1934
Miss Clara Kast, 2004 Spring Garden St., Philadelphia, Pa.	1932
Addison D. Kern, 222 W. Linton St., Philadelphia, Pa.	1929
Miss Natalie B. Kimber, 538 Locust Ave., Germantown, Philadelphia, Pa.	1928
Rev. William U. Kistler, 118 Main St., Pennsburg, Pa.	1911
Prof. W. A. Kline, Ursinus College, Collegeville, Pa.	1911
Charles E. Knopf, 6129 N. Franklin St., Philadelphia, Pa.	1931
Mrs. Ida K. Langman, 520 Pine St., Philadelphia, Pa.	1937
Albert Middleton Laessle, 511 Runnymede Ave., Jenkintown, Pa.	1932
Dr. Henry A. Laessle, 5900 Market St., Philadelphia, Pa.	1894
Arthur N. Leeds, 1025 Westview St., Mt. Airy, Philadelphia, Pa.	Founder
Morris E. Leeds, 1025 Westview St., Mt. Airy, Philadelphia, Pa.	Founder
Dr. Harry A. Lloyd, 200 N. 35th St., Philadelphia, Pa.	1931
Bayard Long, 250 Ashbourne Road, Elkins Park, Pa.	1906
Miss Margaret Loos, Collingswood, N. J.	1935
Dr. Rogers McVaugh, Dept. of Botany, University of Georgia, Athens, Ga.	1930
Adolf Müller, Box 66, Norristown, Pa.	1920
Mrs. George B. Orr, Orchard Way, Berwyn, Pa.	1935
Miss Elizabeth G. Ostheimer, Jenkintown, Pa.	1933
Dr. Samuel C. Palmer, 612 Ogden Ave., Swarthmore, Pa.	1929
Dr. Ruth Patrick, 2119 Spruce St., Philadelphia, Pa.	1937
Dr. G. Harmer Patton, 61 E. Penn St., Germantown, Pa.	1929
Dr. Francis W. Pennell, Moylan, Pa.	1910
Edward Pennock, 3609 Woodland Ave., Philadelphia, Pa.	Founder
Harold W. Pretz, 123 S. 17th St., Allentown, Pa.	1909
Dr. W. H. Reed, Jeffersonville, Pa.	1892
Dr. J. R. Schramm, Dept. of Botany, University of Pennsylvania, Philadelphia, Pa.	1937
Miss Helen B. Shriver, 2004 Spring Garden St., Philadelphia, Pa.	1935
Lee Sowden, 3823 Oak Road, Germantown, Philadelphia, Pa.	1901
Dr. Walter Steckbeck, Dept. of Botany, University of Pennsylvania, Philadelphia, Pa.	1925

	Elected
Hugh E. Stone, 431 Berkley Road, Haverford, Pa.	1892
Dr. Witmer Stone, Academy of Natural Sciences, Philadelphia, Pa.	Founder
J. Fletcher Street, 1120 Locust St., Philadelphia, Pa.	1918
Mrs. Kenneth E. Stuart, 367 Baird Road, Merion, Pa.	1933
Dr. Robert R. Tatnall, 1100 W. Tenth St., Wilmington, Del.	1928
Miss Grace M. Tees, 458 Locust Ave., Germantown, Philadelphia, Pa.	1934
Arthur H. Thomas, Haverford, Pa.	1928
Horace E. Thompson, 5016 Schuyler St., Germantown, Philadelphia, Pa.	1920
William Thompson, 500 Spruce St., Darby, Pa.	1936
Harry W. Trudell, 2030 E. Madison St., Philadelphia, Pa.	1915
Prof. Rodney H. True, Morris Arboretum, Chestnut Hill, Philadelphia, Pa.	1925
Paul R. Wagner, Ursinus College, Collegeville, Pa.	1935
Robert F. Welsh, 132 S. 4th St., Philadelphia, Pa.	1909
Dr. Edgar T. Wherry, Dept. of Botany, University of Pennsylvania, Philadelphia, Pa.	1925
Dr. Edward E. Wildman, 4331 Osage Ave., Philadelphia, Pa.	1931
Hans Wilkens, 241 S. 11th St., Reading, Pa.	1928
William H. Witte, R.F.D., Riegelsville, Pa.	1898
Miss Mary F. Wright, Boxwood Farm, Ambler, Pa.	1928

HONORARY MEMBERS

Samuel N. Baxter, Morris & Abbotsford Sts., Germantown, Philadelphia, Pa.	1918
Dr. Joseph S. Illick, State College of Forestry, Syracuse, New York	1925

CORRESPONDING MEMBERS

Dr. John H. Barnhart, New York Botanical Garden, New York, N. Y.	1936
Otway H. Brown, 1048 Washington St., Cape May, N. J.	1908
Stewart H. Burnham, Cornell University, Ithaca, N. Y.	1911
Prof. M. L. Fernald, Gray Herbarium, Harvard University, Cambridge, Mass.	1929
Dr. A. Arthur Heller, Chico, Calif.	1893
Dr. Harold St. John, University of Hawaii, Honolulu, T. H.	1927
Charles F. Saunders, Pasadena, Calif.	1893
Dr. William Randolph Taylor, University of Michigan, Ann Arbor, Mich.	1921
Dr. Campbell E. Waters, Washington, D. C.	1904
Dr. Heber W. Youngken, Massachusetts College of Pharmacy, Boston, Mass.	1918

RECENTLY DECEASED MEMBERS

	Died
Dr. Charles H. La Wall, Active	Dec. 7, 1937
George Redles, Active	Jan. 20, 1937

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ARTHUR N. LEEDS

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BARTONIA

PROCEEDINGS OF THE PHILADELPHIA BOTANICAL CLUB

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Nuttall's Plant Collections in Southern Delaware

ROBERT R. TATNALL

Thomas Nuttall came to Philadelphia from England in 1807 or 1808.[1] Then a lad 21 years of age, he came under the influence of William Bartram and of Benjamin Smith Barton, by whom his botanical career seems to have been largely determined.

Nuttall's first collecting was in the immediate vicinity of Philadelphia, including southern New Jersey. His first longer trip, early in 1809, was, in the words of his nephew, T. J. Booth, " to the mountainous part of Delaware, Sussex County ". Among the Barton papers recently discovered by Mrs. John R. Delafield (see Appendix E, of Dr. Pennell's sketch), is an interesting letter from Nuttall to Barton, dated " Lewes-town [now Lewes, in Sussex County, Delaware], June 16, 1809 ". It is marked, in Barton's handwriting, " Received Monday–evening, June 19, 1809 ".

This letter, given in full below, shows that Nuttall traveled by boat, leaving Philadelphia " Sunday morning at 7 o'clock ". The boat anchored that night in the mouth of Duck Creek. Here Nuttall noted a few plants in the marshes, " but I believe nothing uncommon ", and remarks on the abundance of King Crab on the " beech ".

In this connection it is worth noting that the modern name " Bombay Hook ", designating the strip of beach which extends southward several miles from the village of Woodland Beach, Kent County, Delaware, is derived from " Bumba ", the Swedish word for the king crab, or *Limulus.* The Swedish settlers gathered these animals by the thousand, to be dried in the sun, crushed, and used for fertilizer. The name of this part of the Bay shore is properly pronounced " Bumba Hook ".

On Wednesday, Nuttall was at Lewes, and this is the first of nine days, previous to the date of the letter, spent about Lewes and Cape Henlopen, and farther south in the vicinity of " Dagsbury " (Dagsboro), situated on a tributary of Indian River. The trip from Lewes to Dagsboro may have been by boat, sailing down the coast to the mouth of Indian River, thence inland by Indian River Bay. From the itinerary outlined in the letter, it is evident that the latest possible date for the start from Philadelphia was June 4th, but it may have been a week earlier. After June 16th, the date of the letter, nothing is known of the length of Nuttall's stay in Sussex County, or of the time and manner of his return to Philadelphia.

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[1] See Pennell: " Travels and Scientific Collections of Thomas Nuttall ", in Bartonia, 18: 2, 1936; and " An English Obituary Account of Thomas Nuttall ", in Bartonia, 19: 52. 1938.

From Dagsboro, two excursions were made into the nearby Great Cypress Swamp. The letter to Barton follows. Matter in square brackets is inserted by the present editor.

> " Received Monday–evening, June 19th, 1809." [in Dr. Barton's handwriting]
>
> " Honor[e]d Sir,
>
> I fear you have been anxiously expecting to hear from me before this time, but as I could not communicate any thing with certainty respecting the subject in hand at an earlier period you will perhaps excuse the delay. We did not reach Lewes–town, till Tuesday afternoon & left Phila[delph]ia Sunday morning at 7 o'clock. On Monday evening we harboured in the mouth of Duck–creek & went on shore on the lower side of the creek on a marsh about 10 miles long taking in both sides of the creek, and about 5 in breadth. I found here abundance of what they call samphire [*Salicornia*], Baccharis halimifolia, called kinks bush, a species of Aster with very broad leaves, but I believe nothing uncommon. With the Baccharis I found, a lucid red stalkd plant with longish narrow leaves recently sprung up from seed. On the beech lay in great abundance what is called the King Crab. On Wednesday in consequence of your introductory letter Dr. Harris favored me with his company part of the day but we unfortunately took a most uninteresting rout in & about the salt marshes in the vicinity of the town[.] all I saw extraordinary was the samphire in much greater perfection here than at Duck Creek, and a small procumbent plant with a purplish flower, & thick juicy leaf [? *Spergularia*]. On Thursday I visited the cape. On the sandy beach I found in great plenty a plant resembling the Heath, and called so here, full of fine yellow blossom [of course *Hudsonia tomentosa*]. About the light-house in a narrow wood which runs up 2 miles above it to salt-works, I met with what I take to be the ilex dahoon [? *Ilex glabra*], called bear-bush, a species of smilax evergreen [*Smilax laurifolia*], called goat-briar, & in a wet shady part of the wood abundance of the Viscum [*Phoradendron*], an Orchis which they say has white flowers but know no name for it [*Habenaria blephariglottis*]; not being in flower I could not tell what it was, but am afraid it will only turn out to be the Orchis ciliaris [*Habenaria ciliaris*]; the deer-berry [probably *Vaccininm stamineum*], &

Myrica cerifera are here in great abundance. I have forgot to mention in its place, that on the sandy beach I found a large thick fleshy leav'd plant which I have sent [no doubt *Cakile edentula*]. On Friday I went again thro' the cape, part of the time in company with a Mr. Rodney late chief judge of the state[.] we went particularly in quest of a plant said by several people of the town to be native of the cape, called Coral Honeysuckle [*Lonicera sempervirens*], on account of the fine scarlet colour of its corolla. it is what I have seen cultivated in many gardens in Phila[delph]ia and I believe known there by the same name, but after carefully searching the places where it was said to grow we could not find it; it had either been all taken up to supply gardens, or has been buried in the advancing & almost perpendicular sand hills, which skirt the wood on the side next the sea. In and about the wet open woods and ponds near the town I found a diandrous plant with a fine yellow flower resembling gratiola [*Gratiola aurea*], an aquatic plant having the leaves which are under the water pinnate in almost capillary divisions, the leaves above the water serrated, these 2 are in great abundance [unmistakeably *Proserpinaca palustris*]. A small plant with light green leaves spreading close to the surface of the ground armed with setaceous stipula [perhaps *Diodia virginiana*]. On Saturday I went into a swampy wood about 2 miles from Lewes belonging to Daniel Wolfe a well known respectable farmer. In the open part of the swamp I found the Heritiera [? *Lachnanthes tinctoria*] & I believe the Pleea [? *Tofieldia racemosa*][.] abundance of Utricularia was here in flower in loose spikes of 4 or 5 flowers each & a plant which at first I took to be aletris but which I found to be very distinctly different but not yet in flower. [This may have been *Polygala ramosa,* now found in some abundance at Ellendale.] In the wood I found what I suppose is called the Fringe-tree [*Chionanthus virginica*], but very sparingly and here they had no name for it, I have sent some shoots of it. In the edge of the swamp grew the Sarracenia purpurea, and Kalmia angustifolia. On Monday I went towards Dagsbury, found little or nothing of consequence in the road excepting that I saw an iris with very narrow leaves [*Iris prismatica*], and a dydinamious plant with a brownish flower in the road side. Coming to the head of Indian river I anxiously expected to find the Illicium[.] I sought for it carefully, & went 2 or 3 miles round its head but all in vain, I am persuaded it has never been found here. The appearance of the river here is that of a stagnant pond filled with half dead trees, but not so as to hinder the prospect[.] all the aquatic plants I could percieve and those not in abundance were the Nymphaea odorata & N. lutea now in flower, the trees were principally Dyospyros, Nyssa, Maple, Ash, Magnolia, &c. many of them half covered with moss and Viscum. Leaving the river, & proceeding on my way to Dagsbury, (& indeed I had spent a considerable time about the river, and felt much disappointed), I came to a place about 3 miles this side Dagsbury w[h]ere the road divided[.] I went up to a good looking house belonging to a Colonel Kalosk to enquire the road by whom I was very politely treated, and upon understanding my object he furnished me unasked with an introduction in the 1st place to a Mr. Waples proprietor of the head of the swamp and also to Mr. Wells, Esquire, proprietor of nearly all the swamp. On Tuesday morning leaving Mr. Waples, within a mile of the entrance of the swamp I met with an old man who usually conducts strangers into the swamp. Near his house but in the woods & evidently wild grew the Yucca but very small. The old man went with me and in about a mile from this house we began to enter one of the most frightfull labyrinths you can imagine[.] it was filled with tall tangling shrubs thickly matted together almost impervious to the light[;] among the shrubs was the ilex already mentioned[,] smilax, &c. It was very wet; knee deep in sphagnum if you stept off the bridges of wooden causeways. There were some open places called savannahs, but were literally ponds at this time of the year, but are dry in summer I could perceive nothing growing in them but the 2 Nymphaeas, and what I have taken to be the Pleea, and on the edges of these ponds grew the cupressus disticha [*Taxodium distichum*]. In a shady part of the swamp the old man pointed out to me what they here call the Bay-bush which they use for dying yellow, it was not in flower; I suppose it must be the Hopea [no doubt *Symplocos tinctoria*]. I saw nothing else new that I remember, & I proceeded to Dagsbury where I was very kindly entertained by Mr. Wells[.] on Wednesday I went across the swamp about 7 miles without meeting with one extraordinary vegetable excepting the Bartonia but which of the species I could not tell, about the place where I found this solitary specimen there had last year been abundance but appeared to have been destroyed before it had come to seed, nearly all this part of the swamp I passed through appeared too wet for herbaceous vegetation being covered with little else but Sphagnum, fern, Magnolia, ilex dahoon, &c. There are no cranberrys, in the swamp at all where I passed thro and the people living on the edge of this part of the swamp scarcely knew what I meant by cranberrys when I described them, neither did I see the Drosera[.] having passed thro the swamp and coming to higher ground I met with abundance of the Hopea as I take it—some trees 20 foot high & ½ a foot diam. In this part of the swamp there are bears not unfrequently met with as many as 7 having been caught not many months back. On Thursday I returned to Lewes-town[.] met with nothing particular on the way till with[in] about 3 miles of the town in a dry wood I met with a tetrandrous plant which at first I took to be some species of Gentiana, but it is evidently no such thing [? ————]. I can trace almost all the way from Dagsbury the Spermacoce diodina [*Diodia teres*]. On Friday I

> went about in the neighbourhood of the town, but found nothing extraordinary and the day turned out wet. I expect the person by whom this letter & the plants come will take the utmost care of them[.] the plants are in 2 boxes[,] the 1st contains all the plants I found about Lewes town & the Cape, the 2nd contains chiefly what I found in the road to Dagsbury and the swamps. I recieved your letter containing another for Col. Hale which I deliverd, and telling him my intention of going again thro the swamp in another direction to Nanticock [Nanticoke] river he promised me an introductory letter to a General Bull, &c. &c. I have forgot to mention that while at Mr. Wells, the late governor of the state General Mitchell was there on a visit & very kindly invited me to call upon him if I came to broad-creek [This is no doubt the present Broadkill River]. I have not got the tin-boxes you spoke of in your letter.
>
> Yours, &c
>
> T. NUTTALL."

The fate of all the specimens sent to Barton is a matter of conjecture. Some can be accounted for, however, as among the plants deposited at the Academy of Natural Sciences by the American Philosophical Society, there is a small packet marked in Barton's hand "Plants coll. by Mr. Nuttall, Delaware". At the request of Dr. Francis W. Pennell, I have examined these specimens, and identified them as far as possible. They are preserved in 10 by 12-inch folders of rough drying paper, and are entirely without labels or other clue to their history, excepting only the above inscription on the outside of the package. Many of the specimens are in poor condition, and they consist for the most part of small twigs broken from trees or shrubs, and the upper portions of herbaceous plants. I am indebted to Mr. Bayard Long for checking my identifications of them.

The roster of species in this collection follows. Curiously enough, only 8 of the 43 plants are mentioned in the letter to Barton, as having been seen. The list comprises: *Taxodium distichum; Chamaecyparis thyoides* (represented by a 3-inch twig); *Pinus virginiana* (young leaves of the season only); *P. Taeda* (3 leaf-bundles only); *Festuca myuros*; *Arrhenatherum elatius*; *Smilacina racemosa*; *Smilax laurifolia* (in early fruit); *Habenaria* sp. (immature fragment); *Arethusa bulbosa*; *Cleistes divaricata*; *Quercus alba*; *Q. nigra*; *Q. marilandica*; *Celtis occidentalis* (with fruits and leaf-galls); *Silene antirrhina*; *Persea palustris* (two collections in early bud); *Sarracenia purpurea* var. *gibbosa* (in full flower); *Drosera intermedia* (scraps); *Itea virginica; Rosa eglanteria* (fragment); *Sanguisorba minor* (leaves only); *Melilotus alba*; *Polygala ramosa* (2 collections: now known in Delaware from Ellendale only); *P. incarnata*; *P. lutea*; *P. mariana* (fragment); *Ilex glabra* (one collection in flower; one in ripe fruit); *Hudsonia tomentosa* (3 collections); *Rhexia mariana*; *Proserpinaca palustris*; *Leucothoe racemosa*; *Vaccinium macrocarpon* (one spray with bud); *Samolus floribundus*;

Nymphoides aquaticum; *Asclepias verticillata* (leaves only); *Chionanthus virginica* (4 collections); *Utricularia fibrosa*; *Houstonia purpurea*; *Lonicera sempervirens*; *Viburnum nudum*; *Artemisia vulgaris*; and *Tragopogon porrifolius* (one head,—neither stem nor foliage).

The presence of Coral Honeysuckle and Cranberry among the specimens, both of which are mentioned in the letter to Barton as looked for but not seen, seems to show that at least a little time for further collecting was available between June 16 and Nuttall's return to Philadelphia.

Going back to the text of the letter: Duck Creek, where the first landing was made, is the present Smyrna River, which is the boundary between New Castle and Kent counties, Delaware. The plants seen there were probably all in Kent County. All the rest belong to Sussex County.

Of the discoveries in the vicinity of Lewes, the " plant resembling the Heath " is of course *Hudsonia tomentosa*[2]; " ilex dahoon " is quite likely *I. glabra*; " smilax evergreen " must be *S. laurifolia*, which is represented in the collection; " Viscum " is *Phoradendron*. Near the head of Indian River, Nuttall " anxiously expected " *Illicium*, and " sought for it carefully ", but why he should expect to find it so far north of its range is hard to understand.

The great Cypress Swamp is still full of " the most frightfull labyrinths " over a wide area, but a good road now traverses it from Selbyville on the east to Gumboro on the west. *Symplocos* still grows there in considerable abundance, as well as in drier places elsewhere in the county. Nuttall was no doubt pleased to be able to inform his patron of his discovery in the Swamp of Barton's namesake (species undetermined). Both of our northern species of *Bartonia* are to be found there at the present time.

---

[2] This was Nuttall's first acquaintance with this species which, nine years later, he described as new to science.

Notes on Monotropsis[1]

WILLMAN SPAWN

The genus *Monotropsis,* a small member of the Indianpipe family, Monotropaceae, was overlooked by Bartram and Michaux in their travels through the south. Lewis David von Schweinitz,[2] the mycologist, discovered this plant near Salem,[3] North Carolina about the year 1817.[4]

He included a description of *Monotropsis odorata* in his own extensive phanerogamic manuscript, and sent another to Stephen Elliott of Charleston, S. C., author of " A Sketch of The Botany of South Carolina and Georgia ".[5] In the manuscript " Synopsis Plantarum Americanarum " he called the plant by this name, as is shown in the following quotation from page 161.[6]

> " *Monotropsis. Calyx 5-phyllus, marcidus. Cor. 1-phylla campanulata carnosa, limbo 4-fido, demum reflexo: laciniis ovatis, acutis.
> 1. odorata: albida glabra.
> Hab. in Carolina boreali prope Salem ⊙ Schweinitz."

Elliott reproduced the description sent to him by Rev. L. D. von Schweinitz and inserted a paragraph of explanation in which he expressed the desire that the plant be called *Schweinitzia* rather than *Monotropsis.* It was not until the following February that the combination *Schweinitzia odorata* was used in a publication of C. S. Rafinesque.[7] Therefore *Monotropsis odorata* has priority over the name *Schweinitzia odorata.* In the same year Nuttall listed this new genus in the appendix to his " Genera of North American Plants " and referred to a specimen in the herbarium of Zaccheus Collins which he had seen.[8] Don in his “ General System of Gardening ” in 1836 quoted from memory and used the name *Schweinitzia caroliniana*, which must be cited when listing synonyms.

---

[1] For kind assistance, I am indebted to Mrs. Agnes Chase, Wm. J. Fox, E. P. Killip, P. L. Ricker, Dr. C. L. Shear, Dr. E. T. Wherry, and for species illustrations Ralph W. Armstrong.

[2] The prefix " von " is used because in going over all the correspondence and manuscripts in the Library of the Academy of Natural Sciences of Philadelphia, we find that the prefix " de " is only used when he was writing in Latin.

[3] This is the same as the present Winston-Salem, N. C. in Forsyth Co.

[4] This date was determined by the fact that it was inserted in his manuscript copy of " Synopsis Plantarum Americanarum " on the margin, and his " Synopsis " was prepared in the early part of that year because of the species of Elliott's which he had included in the main part of the text. The published description of *Monotropsis* in Elliott's Sketch of the Botany of South Carolina and Georgia appeared in Dec., 1817.

[5] For the dates of publication of Elliott's Sketch see Barnhart in Bull. Torrey Bot. Club 28: 680-688, 1901. *Monotropsis* appears on page 478 of vol. 1.

[6] This vast work of von Schweinitz's remained unknown for over one hundred years except for the mention in the von Schweinitz letters. Miss Tees recently discovered this " Synopsis Plantarum Americanarum " in an old box in the herbarium of the Academy of Natural Sciences of Philadelphia.

[7] Rafinesque, C. S., American Monthly Magazine 3: 99, 1818.

This specimen sent to Collins which Thomas Nuttall had seen may prove to be the type specimen if it was gathered by L. D. von Schweinitz prior to 1816. If so it will have to be considered that von Schweinitz had forgotten to insert a description of it when he prepared his “ Synopsis Plantarum Americanarum ” in 1817.[9] For von Schweinitz did not keep an herbarium of flowering plants until the latter part of his stay in North Carolina.

There are four specimens of von Schweinitz’s collecting but which one should be considered the “ Type ” still remains a problem.

1. “ Schweinitzia odorata N. Carol *Decandria Monogynia.* (Monotropeae) Schweinitzia odorata *Elliott* (L. D. de Schweinitz) ”	Durand, Paris
2. [One small plant labeled] “ Schweinitz coll., Durand donor ”	Gray Herbarium
3. [Torrey Herbarium Sheet] “ Schweinitzia Nutal. odorata Schwein.”	New York Bot. Garden
4. [Two small specimens] “ (herb Schw) ” laid in	Acad. Nat. Sci. Phila.
“ (herb Schw) sub novis “ Schweinitzia odorata Salem ” N. C.	Acad. Nat. Sci. Phila.

The specimen in the Durand Collection in Paris, which is likely from Collins’ herbarium even though it is not in his script, was labeled by Conrad. The specimen in the Gray Herbarium is likely part of the same material since it was given to that institution by Durand. The one sheet in the New York Botanical

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[8] Collins Herbarium was purchased at a public sale in 1833 partly by von Schweinitz and the duplicate specimens were purchased by C. S. Rafinesque. Whether or not any other person bought part of the herbarium remains unknown. Von Schweinitz’s portion of the herbarium was left to the Academy of Natural Sciences of Philadelphia. Rafinesque’s specimens passed to Elias Durand, and so eventually to the Museum d’Histoire Naturelle at Paris (see Bartonia 17: 42. 1936). However, the specimen of *Monotropsis odorata* in Durand’s herbarium is not in the handwriting of Collins but in that of Nuttall and S. W. Conrad.

[9] There has been much controversy as to when von Schweinitz started to study Phanerogamic plants. For it was stated in Elliott’s book that “ . . . although the attention of Mr. Schweinitz has hitherto been principally directed to the natural order of the Fungi, yet no branch of our botany has escaped his notice, . . .” We however find definite proof that his interest in flowering plants started in 1816 from the preface of his manuscript work, “ Flora Salemitana ”, in which he states that he turned his attention to the Phanerogamic plants as well as to the other forms of Cryptogamic plant-life in 1816. In a letter to Torrey he states that he started to study the Lichens and Hepaticae after his return from Europe in 1819.

Garden is a specimen sent to Torrey by von Schweinitz in a package of Fungi which had been requested by letter of Dec. 29, 1819. This could hardly be considered the type specimen since von Schweinitz wrote Torrey that as soon as he could collect more material he would send him specimens.

The specimens in the herbarium of the Academy of Natural Sciences of Philadelphia are mounted on sheets with later specimens of *Monotropsis.* There is the possibility that the specimens may not be with the correct labels. It is however very odd that the handwriting is not that of von Schweinitz or of any other contemporary botanist although the label is on the same type of paper and the plant is mounted like the other specimens of the von Schweinitz herbarium handled by J. H. Redfield. In the author's opinion these specimens should be considered the type even though the name *Schweinitzia odorata* is used. In the catalogue to Schweinitz's herbarium he uses the name *Schweinitzia odorata* in preference to *Monotropsis odorata.* Perhaps further study will reveal another specimen or information concerning the type specimen of *Monotropsis odorata* Schw. apud Elliott.

This species remained unknown from the time of von Schweinitz until 1843 when it was rediscovered by Dr. Griffith in the vicinity of Baltimore, Md. at what is now considered to be its northernmost limit. A few years later it was again believed to have been found by Gray and Sullivant at the foot of Table Mt. in North Carolina. So remarkable was this that Dr. Gray devoted seven pages in his "Chloris boreali americana" to a description of this rare plant. However the extensive description by Dr. Gray unfortunately contained a few terminological inexactitudes and these were not discovered until the Rev. W. Wolf of St. Bernard College in Cullman Co., Alabama started to study *Monotropsis* after he was shown it growing on the College grounds in 1901. It was at first taken to be the small fragrant Indianpipe *Monotropsis odorata,* until enough more was found to make an anatomical study of the plant in later years; eventually he undertook to make even an extensive study of climatic relationship which resulted in describing it as an entirely new genus and species, *Cryptophila pudica* Wolf. He shortly thereafterwards realized that it was the same as *Monotropsis odorata* but that the description of Dr. Gray's of the anthers and capsule was wrong.[10] The plates that accompanied Dr. Gray's description are of unique interest in the fact that he not only illustrates the one known species at that time, with detailed drawing of the flower parts, but the two outer stalks illustrated are drawn from specimens of *Monotropsis Lehmaniae* collected at the foot of Table Mountain. This was not described until 1906[11] by Burnham, who made a close examination of the specimens collected there.

Interest was aroused by this article of Dr. Gray's, as is evident from the great abundance of herbarium material collected between 1850 and the turn of the century. In 1883 Miss Reynolds of St. Augustine, Florida, discovered in the vicinity of her home a new plant of which she gathered many specimens, some of which found their way to Dr. Gray who named it in her honor. There is only one specimen of all the *Monotropsis Reynoldsiae* in the different herbaria which was not collected by Miss Reynolds, the discoverer of the new species. So extensive was her collection that several sheets can be found in most of the large herbaria in this country. Whether or not a more extensive study will reveal *Monotropsis Reynoldsiae* in other scrub-oak thickets, besides those near St. Augustine, Florida and in the Indian River region, only field work will show. However, at present its range is very limited.

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[10] The American Midland Naturalist 7: 104-123, 1922.

The third species about which there has already been some discussion, has a much larger range and is an autumnal bloomer like the foregoing. In the fall of 1903 Miss Lehman discovered, in great abundance near Roaring Gap, North Carolina, what she believed to be *Monotropsis odorata*. She noticed that it differed in the fact that it bloomed in the fall and that the corolla was only one half to three quarters the length of the calyx, and that it also lacked the odor which is so prevalent in *Monotropsis odorata*. She again found it in the following years and so in 1905 she sent specimens to Stewart H. Burnham who described it in Torreya,[11] naming it *Monotropsis Lehmaniae* in honor of the collector. This species has been found by many botanists although they do not realize the difference which is very easily observed. It appears to be as common as *Monotropsis odorata* is in its region. The type specimen of this species is well preserved in the herbarium of Cornell University.

The three species may be distinguished as follows: [12]

Corolla as long as the calyx or shorter, colored; scales ovate.
  Corolla-lobes much shorter than the tube, scarlet to white, turning black when old; plants 5 to 12 cm. high .... *M. odorata*
  Corolla-lobes about as long as tube, purplish-brown, turning brown when old; plants 4 to 10 cm. high .... *M. Lehmaniae*
Corolla about twice as long as the calyx, white; scales lanceolate to linear; plants 4 to 15 cm. high .... *M. Reynoldsiae*

There is no doubt that there are three distinct species as has been intimated by some botanists. It should prove very interesting to see if the range of *Monotropsis Lehmaniae* could be extended any farther north than the northwestern tip of North Carolina and whether the species which is limited to Florida, so far as present records show, has the same colonial habit which is shown in *Monotropsis odorata* and other species of the Monotropaceae. It is important to point out that the fruit of *Monotropsis* has rarely been found; upon close observation it was noted that ants eat the immature capsules and upon tasting these they were found to have a very sweet taste. Perhaps under cultivation the plant might prove to be of commercial importance.

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[11] Torreya 6: 235, 1906.

[12] Slightly changed from key in North American Flora, vol. 29, 1: 15. 1914.

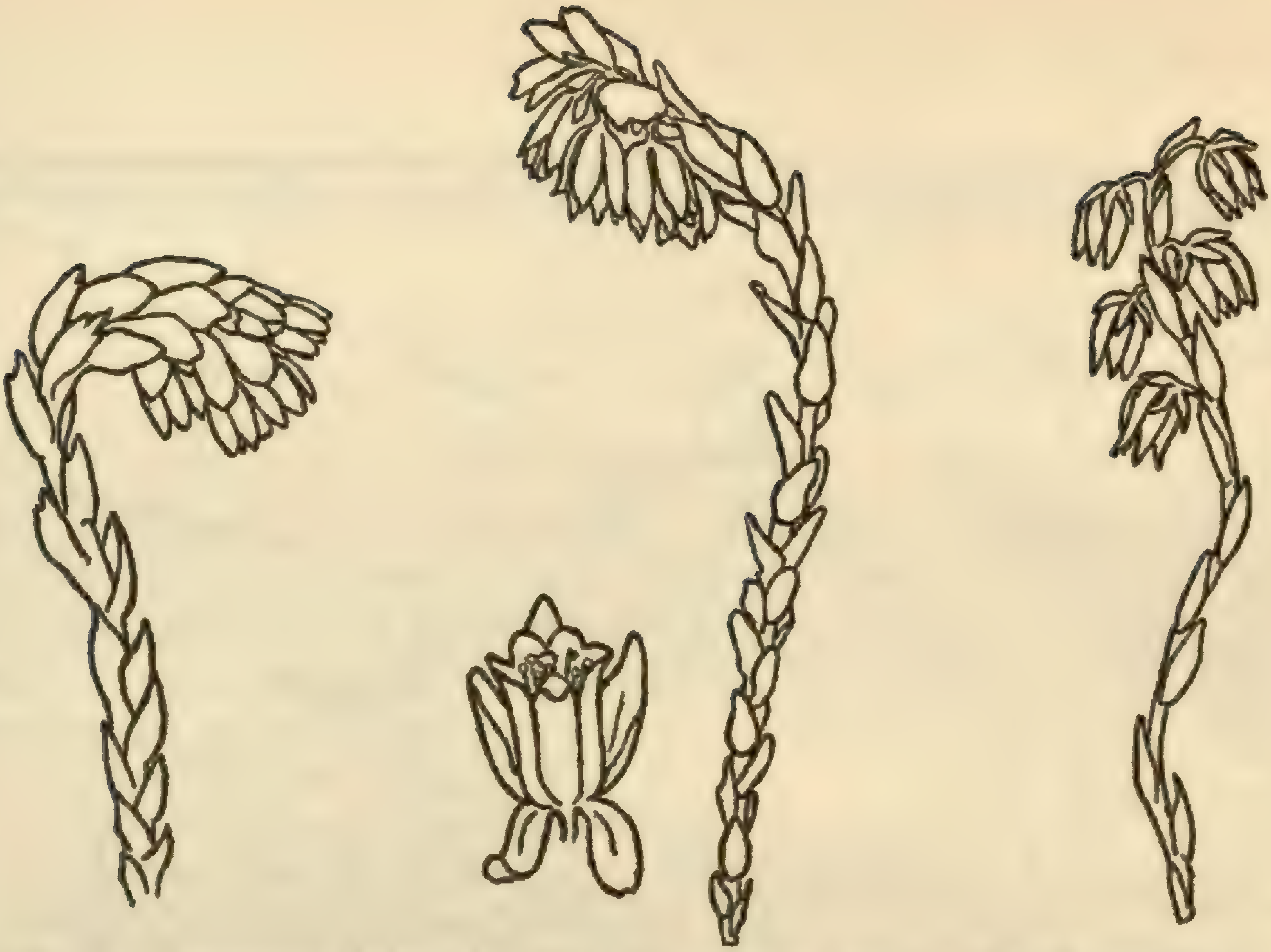

FIG. 1. *Monotropsis Lehmaniae* (left); *M. odorata* (middle); *M. Reynoldsiae* (right). (Drawn, natural size, by R. W. Armstrong.)

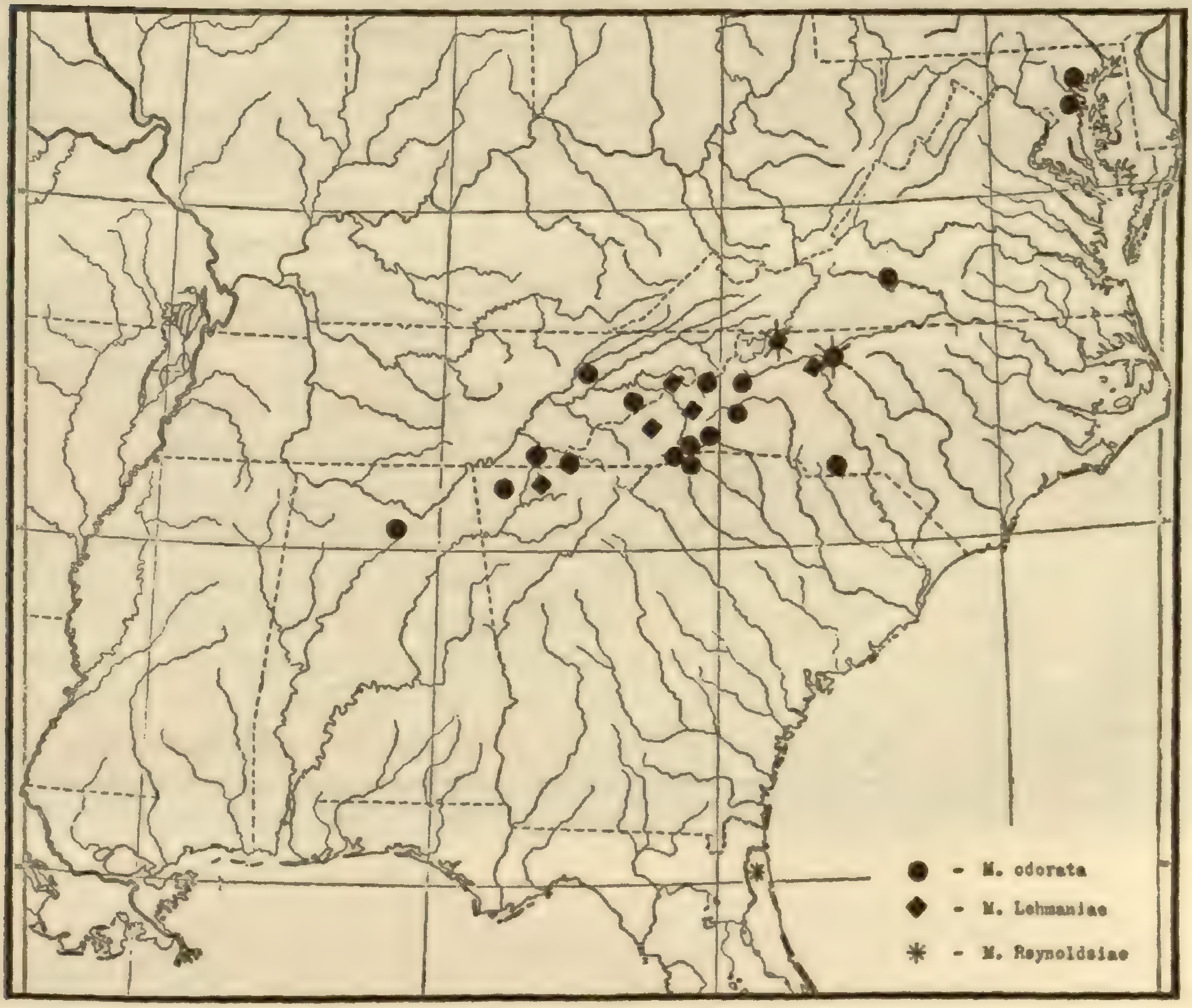
● - M. odorata
◆ - M. Lehmaniae
* - M. Reynoldsiae

FIG. 2. Distribution of species of *Monotropsis.* (Symbols show localities of actual specimens studied, rayed symbols marking type-localities.)

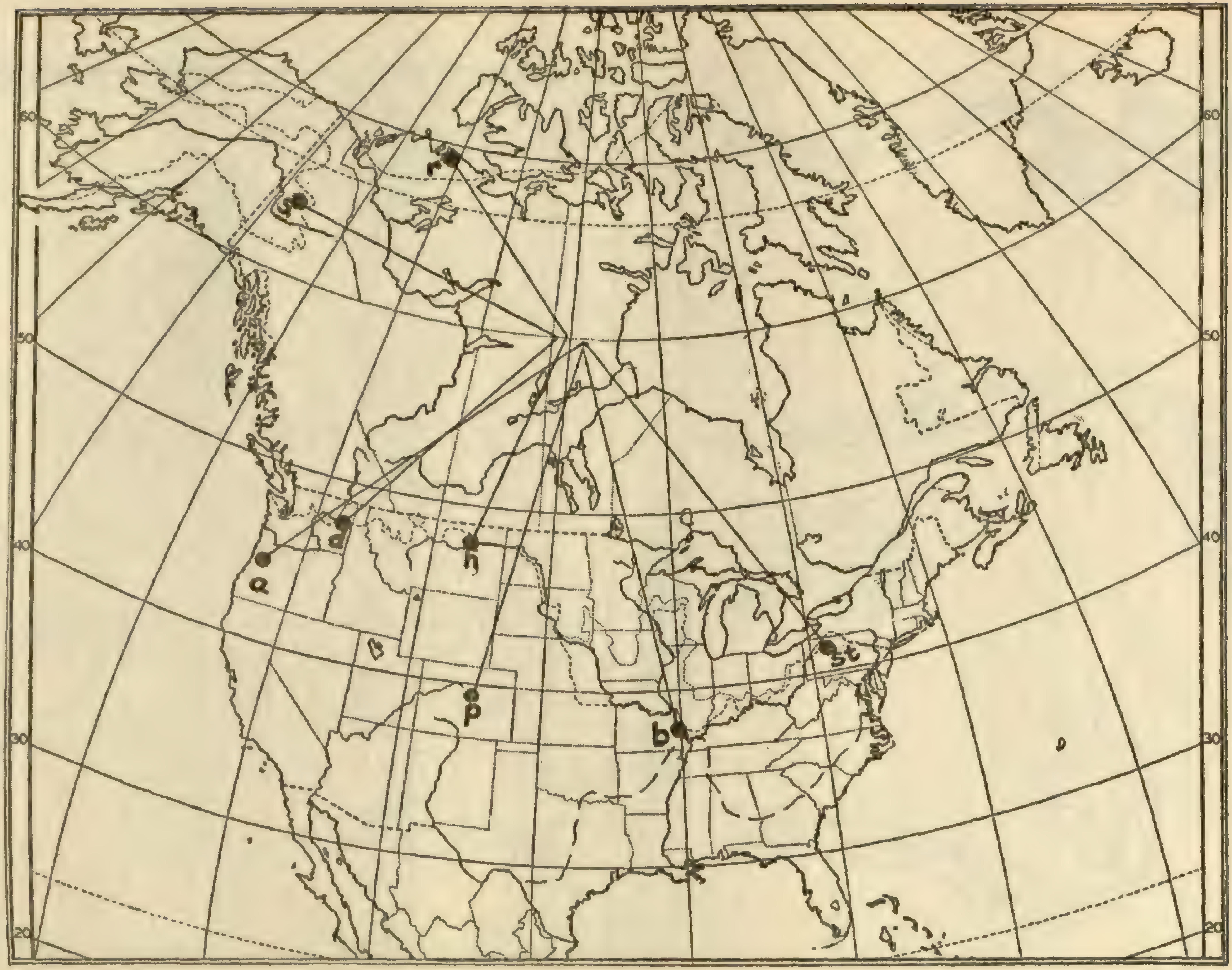
60
50
40
30
20
60
50
40
30
20
s
r
d
a
h
p
b
st

FIG. 3. Inferred dispersal routes of related species of *Phlox*: s = *sibirica*, related to d = *douglasii*; r = *richardsoni*, to h = *hoodii*; a = *adsurgens*, to st = *stolonifera*; p = *patula*, to b = *bifida*.

Geographic Relations in the Genus Phlox[1]

EDGAR T. WHERRY

Twelve years ago, when the American Association for the Advancement of Science met in Philadelphia, I ventured to present before the present Section a preliminary account of the genus *Phlox*, upon which studies had just been undertaken. Now that the Section is meeting in Richmond, within a few miles of the spot where the genus was discovered, a report on the progress of these studies seems appropriate.

Linnaeus became acquainted with the genus in Clifford's garden, to which the plants had come from Gronovius, who in turn had received them from Clayton. The map in the Flora Virginica shows that Clayton travelled to some extent in the Piedmont; and although the species in question, named by Linnaeus *P. glaberrima* in 1753, was not collected again for over 200 years, it has recently been discovered at two or three localities not far southwest of Richmond. One of these places lies near the site of an old ferry which Clayton presumably crossed, so may well represent the very spot where he collected it. (Lantern slides shown.)

Beside *Phlox glaberrima,* the one just shown, there are 11 other species known in Virginia, of which the more interesting from the geographic standpoint are: *P. nivalis,* which reaches its northern limit here; *P. subulata,* of which the southern, glandular variety was named var. *australis* with its type locality near Staunton; and *P. buckleyi,* endemic in the shale region of this state and adjacent West Virginia.

In the western United States there are apparently over 40 species, or around 3 times as many as in the east. The ranges of most of these western ones are, however, restricted, and a map on which the frequency of occurrence of members of the genus is brought out by stippling indicates them to be about as well developed in the east as in the west. While the eastern species are in general only remotely related to the western ones, there are two notable exceptions to this rule. The Appalachian *P. stolonifera* is very similar to the Pacific Coast Range *P. adsurgens,* and the midland *P. bifida* is close to the east-Rocky Mountain *P. patula.* If, as seems reasonable, the respective ancestors of these pairs grew in pre-Glacial times approximately equidistant from the areas at present occupied, their dispersal-center was in the northern part of the continent not far east of longitude 100°.

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[1] Presented at the meeting of the Taxonomic Section of the Botanical Society of America, December 29, 1938.

Before the formation of the ice sheets two species had succeeded in migrating far enough north to escape extermination on that side of the glaciated territory. *P. sibirica,* the only species which crossed Bering Strait and spread into Asia, is most closely related to the Columbia Plateau *P. douglasii*; while *P. richardsoni* of the Arctic shore region is little more than a variety of the High Plains *P. hoodii.* Again assuming equidistant dispersal centers, it is to be inferred that the ancestors of these pairs grew along latitude 60°. Nothing about the distribution of other species opposing it, the conclusion may be drawn that the home of the genus *Phlox* in pre-glacial time lay in the southwest corner of Keewatin Land, as brought out in the accompanying map, figure 1.

A Provisional Key to the Polemoniaceae

Edgar T. Wherry

Keys to the members of the *Polemoniaceae* have been published in several monographs and floras, but they differ widely from one another as to the genera recognized and the diagnostic features used for separating these. Although the writer is studying intensively only the genus *Phlox,* he often has occasion to identify others, and has accordingly drawn up a key which seems to possess some advantages over previous ones. This is here published in the hope that it may aid other taxonomists in gaining an orientation in this difficult family; it is, however, subject to correction and improvement, and suggestions along these lines will be welcome.

While the key is in the standard dichotomous form, two somewhat novel features are introduced to make it more easily followed: the initial noun, or adjective and noun, of each line is placed in capital letters; and any one initial word is used in but a single pair of contrasting lines. The genera are arranged in what now seems their most probable evolutionary sequence, taking into consideration morphology, anatomy, and chromosome features.

CALYX-TUBE remaining unbroken to maturity of capsule; leaves, when present, alternate.

LEAVES pinnately compound; calyx herbaceous and markedly accrescent. POLEMONIUM TRIBE.

STEM short, erect; terminal leaflets foliar.

DURATION perennial; flowers showy, borne in cymose clusters....*Polemonium.*

DURATION annual; flowers inconspicuous, borne in axils of leafy bracts. *Polemoniella.*

STEM elongate, climbing; terminal leaflets modified to tendrils............*Cobaea.*

LEAVES pinnatifid to entire; calyx herbaceous to membranous, subaccrescent. COLLOMIA TRIBE.

SEPALS all alike.

PLANT an undershrub, perennial, or annual.

COROLLA actinomorphic.......................................*Collomia.*

COROLLA zygomorphic.......................................*Bonplandia.*

PLANT a tall shrub or small tree.

INFLORESCENCE corymbose (or flowers solitary); filaments glabrous, basally adnate to the corolla-tube..............................*Cantua.*

INFLORESCENCE racemose; filaments pubescent, adnate up to the middle of the corolla-tube..*Huthia.*

SEPALS unequal; plants annual; inflorescence involucrate.

CAULINE LEAVES present, prickly...............................*Navarretia.*

CAULINE LEAVES absent...*Gymnosteris.*

CALYX-TUBE splitting along intercostal membranes at maturity.

LEAF-BLADES dissected or lobed (in a few annuals, reduced to single lobes). GILIA TRIBE.

HABIT dwarf-shrubby, the stems densely clothed with opposite or subopposite leaves palmately parted into acerose divisions...........................*Leptodactylon.*

HABIT herbaceous-perennial, biennial, or annual.

PRINCIPAL LEAVES opposite, dissected..........................*Linanthus.*

PRINCIPAL LEAVES alternate.

CALYX actinomorphic; corolla also actinomorphic, or in a few annuals zygomorphic.

LEAF-LOBES herbaceous.

CYMULES aggregated into broad corymbs or panicles; seeds ellipsoidal, dark-colored; plants rather delicate perennials or often annuals...*Gilia.*

CYMULES aggregated into thyrsoid panicles; seeds polyhedral, pale, waxy; plants coarse biennials........................*Ipomopsis.*

LEAF-LOBES chartaceous, tipped with long bristles.........*Langloisia.*

CALYX zygomorphic; corolla actinomorphic or somewhat zygomorphic. *Hugelia.*

LEAF-BLADES entire or serrate; position opposite, subopposite, or sometimes alternate; bracts alternate...PHLOX TRIBE.

FLORAL SYMMETRY zygomorphic; leaves dentate or serrate...........*Loeselia.*

FLORAL SYMMETRY actinomorphic; leaves entire or barely serrulate.

COROLLA-LIMB large and showy; seeds unchanged when moistened.....*Phlox.*

COROLLA-LIMB small; seeds becoming sticky when moistened....*Microsteris.*

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LEAVES pinnately compound; calyx herbaceous and markedly accrescent. POLEMONIUM TRIBE.

STEM short, erect; terminal leaflets foliar.

DURATION perennial; flowers showy, borne in cymose clusters. . . . *Polemonium.*

DURATION annual; flowers inconspicuous, borne in axils of leafy bracts. *Polemoniella.*

STEM elongate, climbing; terminal leaflets modified to tendrils. . . . . *Cobaea.*

LEAVES pinnatifid to entire; calyx herbaceous to membranous, subaccrescent. COLLOMIA TRIBE.

SEPALS all alike.

PLANT an undershrub, perennial, or annual.

COROLLA actinomorphic . . . . *Collomia.*

COROLLA zygomorphic . . . . *Bonplandia.*

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INFLORESCENCE corymbose (or flowers solitary); filaments glabrous, basally adnate to the corolla-tube. . . . . *Cantua.*

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SEPALS unequal; plants annual; inflorescence involucrate.

CAULINE LEAVES present, prickly. . . . . *Navarretia.*

CAULINE LEAVES absent. . . . . *Gymnosteris.*

CALYX-TUBE splitting along intercostal membranes at maturity.

LEAF-BLADES dissected or lobed (in a few annuals, reduced to single lobes). GILIA TRIBE.

HABIT dwarf-shrubby, the stems densely clothed with opposite or subopposite leaves palmately parted into acerose divisions. . . . . *Leptodactylon.*

HABIT herbaceous-perennial, biennial, or annual.

PRINCIPAL LEAVES opposite, dissected. . . . . *Linanthus.*

PRINCIPAL LEAVES alternate.

CALYX actinomorphic; corolla also actinomorphic, or in a few annuals zygomorphic.

LEAF-LOBES herbaceous.

CYMULES aggregated into broad corymbs or panicles; seeds ellipsoidal, dark-colored; plants rather delicate perennials or often annuals. . . . . *Gilia.*

CYMULES aggregated into thyrsoid panicles; seeds polyhedral, pale, waxy; plants coarse biennials. . . . . *Ipomopsis.*

LEAF-LOBES chartaceous, tipped with long bristles. . . . . *Langloisia.*

CALYX zygomorphic; corolla actinomorphic or somewhat zygomorphic. *Hugelia.*

LEAF-BLADES entire or serrate; position opposite, subopposite, or sometimes alternate; bracts alternate. . . . . PHLOX TRIBE.

FLORAL SYMMETRY zygomorphic; leaves dentate or serrate. . . . . *Loeselia.*

FLORAL SYMMETRY actinomorphic; leaves entire or barely serrulate.

COROLLA-LIMB large and showy; seeds unchanged when moistened. . . . . *Phlox.*

COROLLA-LIMB small; seeds becoming sticky when moistened. . . . *Microsteris.*

Notes on the Genera

Polemonium. The only circumboreal genus; its pinnate leaves, herbaceous calyx, and open corolla (in typical members) are regarded as primitive in the family. Its taxonomy is in chaos, but there seem to be around 25 species. Chromosome number $n = 9$.

Polemoniella. A group of 3 small annuals, one in northwestern North America and two in southern South America. They are regarded as the result of evolution of *Polemonium* in the direction of self-pollination.

Cobaea. Large lianas ranging from Mexico to northern South America, separable into about 10 species. Their characters seem to represent evolutionary advances from *Polemonium*; $n =$ ca. 26.

Collomia. Though lumped by Gray with *Gilia* (through a misunderstanding) this genus is more closely related to *Polemonium*; it differs in having less complex leaves, less accrescent calyx, more salverform corolla, and seeds which more often become sticky when moistened. It comprises a dozen species in western North America and southern South America, one of the northwestern species also locally extending eastward; $n = 8$.

Bonplandia. A pair of species in southern Mexico and Central America, tentatively regarded as zygomorphic derivatives of *Collomia.*

Cantua. A genus comprising 6 species of shrubs or small trees in Central America and northern South America. Though often regarded as primitive in the family, their characters may be the result of evolutionary advance from *Collomia*; $n =$ ca. 27.

Huthia. Two species from southern South America, perhaps also derived from *Collomia.*

Navarretia. A group of perhaps 25 species of small prickly annuals, found chiefly in Pacific North America, with one in South America. While often regarded as a mere section of the genus *Gilia,* here classed as derived from *Collomia,* by development of spinescence and zygomorphy in the calyx.

Gymnosteris. Two species in the northwestern states, remarkable in having persistent cotyledons, a leafless stem, and an involucrate inflorescence. The somewhat accrescent even though membranous calyx indicates derivation from *Collomia* rather than from *Gilia* as often assumed.

Leptodactylon. This group of 5 or 6 species of the western United States is often lumped with *Gilia,* but differs sufficiently in habit and foliage to make its segregation not unreasonable. Some authors have claimed the calyx to lack intercostal membranes, but these are readily visible when the flowers are carefully examined. While $n = 9$ as in *Gilia,* the chromosomes are smaller than those of that genus.

Linanthus. A group comprising one montane perennial and 15 or 20 annuals, chiefly Californian. These are often grouped with *Gilia,* but differ in the opposite leaves. Here $n = 9$, the chromosomes being identical with those of *Leptodactylon.*

Gilia. The "catch-all" of the family: whenever a new species has been discovered which could not be readily assigned to a well-marked genus, it has been thrown here. As now interpreted, this genus comprises only about 45 species in western North America and 5 in South America. They are mostly annuals with funnel-shaped to rotate corollas of violet or yellow hues, with $n = 9$.

Ipomopsis. While usually classed as a section of *Gilia,* this group of white, yellow, or red-flowered biennials is here regarded as distinct. There are about 10 species, chiefly in the Rocky Mountain region, but one reaches the Pacific and another the Atlantic coast. In these, n = 7, which differentiates them from the Gilias.

Langloisia. A small group of bristly-leaved annuals of the southwestern United States and adjacent Mexico, presumably desert derivatives of *Gilia,* with which they are often lumped.

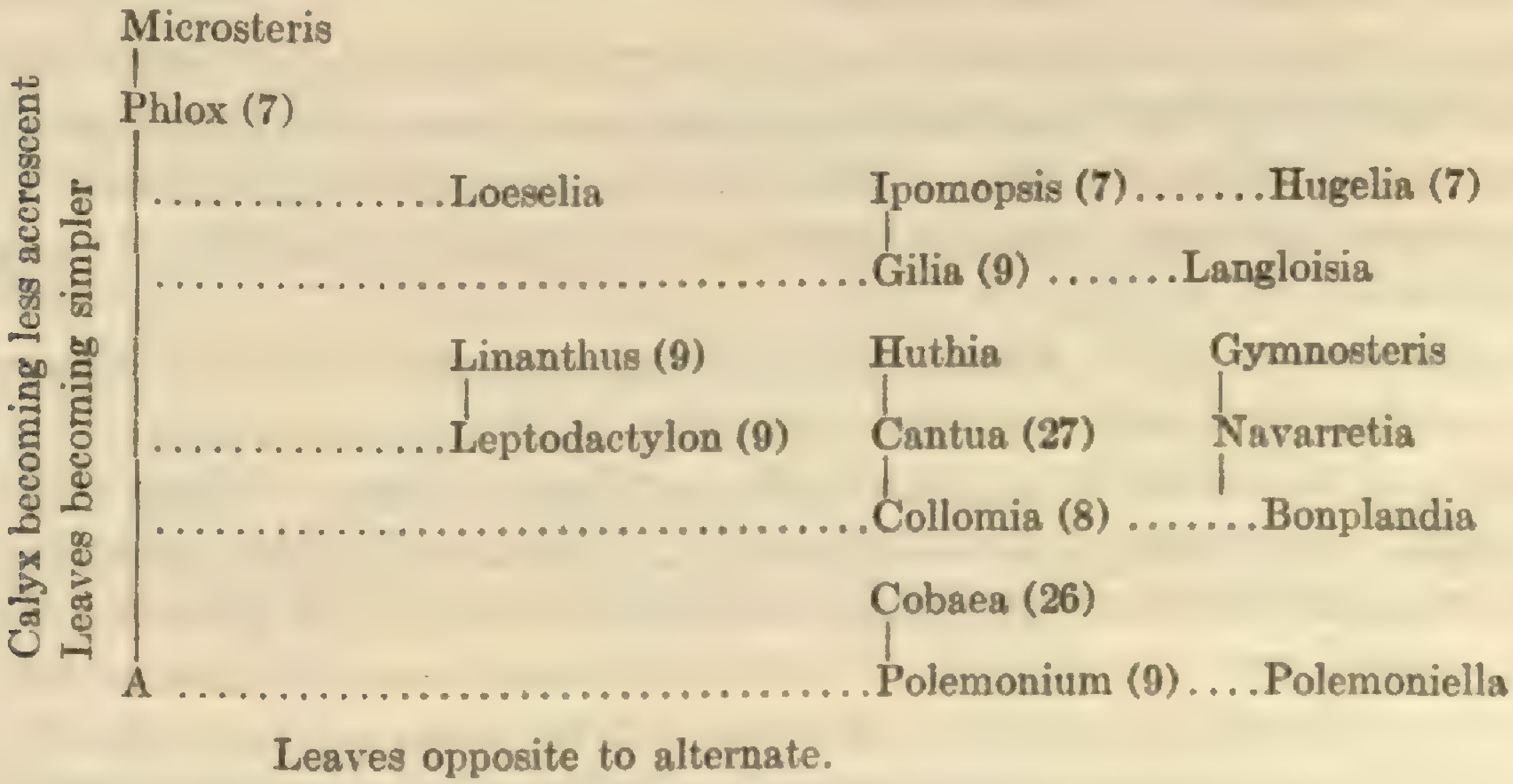
Hugelia. Another supposed section of *Gilia* which may well deserve independent generic status. The 8 species occur in the western United States and northern Mexico. Because of the zygomorphic calyx, Brand grouped them with *Navarretia,* but the presence of intercostal membranes along which the calyx splits indicates them to be derivatives of *Gilia.* They agree with *Ipomopsis* in having n = 7.

Loeselia. This genus comprises about 10 perennials and annuals ranging from Arizona to Central America. They mostly have showy red or violet two-lipped flowers on bracted pedicels in axillary clusters.

Phlox. The most widespread and best known genus of the family, one or more species being native in every state except Maine, Massachusetts, and Rhode Island, and a few also extending into Canada, Alaska, Siberia, and Mexico. About 50 species are recognizable; n = 7.

Microsteris. A few diminutive western annuals constitute this genus, which has been by various authors referred to *Collomia, Gilia,* and *Phlox.* It shows little relationship with the first two genera, and in view of the difference in seeds can scarcely be congeneric with the last, although it may well be a derivative.

In conclusion, the genera discussed may be tabulated in such a manner as to bring out graphically the inferred evolutionary relations between them. The numerals represent the haploid chromosome numbers, as recorded by Flory (Cytologia, Fujii Jub. Vol.: 171, 1937.)


Microsteris
Phlox (7)
Loeselia
Ipomopsis (7)
Hugelia (7)
Gilia (9)
Langloisia
Linanthus (9)
Huthia
Gymnosteris
Leptodactylon (9)
Cantua (27)
Navarretia
Collomia (8)
Bonplandia
Cobaea (26)
A
Polemonium (9)
Polemoniella
Calyx becoming less accrescent
Leaves becoming simpler
Leaves opposite to alternate.

Coastal Plain Plants in Southeastern Augusta County, Virginia, in the Valley and Blue Ridge Provinces

Lloyd G. Carr

Finding a considerable number of characteristic coastal species in southeastern Augusta County near the foot of the Blue Ridge Mountains has led to an investigation, and to a complete consideration of the species occurring there in bogs, swampy meadows, and ponds.

As each favorable habitat mentioned possesses a more or less distinct flora compared with the others, it appears worth while to discuss each with its particular flora. All the bogs, swampy meadows, and ponds are scattered from Sherando to Avis Station near the Blue Ridge at an altitude of 1600 feet and within a distance of fifteen miles.

The most characteristic bog of the region is Magnolia Swamp located near Avis Station four miles southwest of Stuart's Draft. The bog lies some distance from the mountains essentially in a limestone region. Both acid- and lime-loving plants are found here (Carr, 1937). The acid-loving plants are rooted in the mediacid topsoil derived from decayed vegetable materials, whereas the lime-loving ones have their roots in such positions that they are bathed by the upwelling limy spring water. From the general appearance of the bluff overlooking the swamp and the worn and rounded character of the sandstone rocks there is an indication that during uplifts of the valley peneplains streams were cut off and covered over, in turn producing underground springs, the upwelling water being an outlet to these springs.

Many of the acid-loving plants growing here are coastal plain species. They occur in two well defined zones—the meadow portion and that portion which is overgrown with *Magnolia* trees. The meadow area affords excellent habitats for the coastal species. Here is found a considerable quantity of black soil lying in black pools of water.

The mire varies in its water content from extreme to slight. Arising here and there above the miry level are numerous sphagnum hummocks, while one whole edge of the meadow appears to be a sphagnum bog. Where the mucky soil is rather consistent, the coastal sedges, *Scleria reticularis pubescens* and *Dulichium arundinaceum* are found associated with *Xyris flexuosa, Sabatia gracilis, Scutellaria integrifolia, Rhexia virginica,* and *Gerardia purpurea.* Where the soil is slightly covered with water *Utricularia subulata* is hidden by *Scleria* and *Rynchospora.* On the mounds of sphagnum and at the bases of pine trees (*Pinus rigida*) *Bartonia virginica, Polygala cruciata,* and *Drosera rotundi-*

folia are seen. Where the mucky portions blend in with the firmer parts of the meadow *Iris virginica* is the predominant plant. Close by, near sluggish streams, are *Sagittaria lancifolia* and *Eupatorium rotundifolium* var. *ovatum.* This assortment of plants gives a distinct coastal aspect to the swamp.

What is most surprising when one turns his attention to the over-grown portion is the occurrence of a fairly large colony of well developed Magnolia trees, *Magnolia virginiana.* There are over one hundred trees reaching a maximum height of approximately twenty feet. Growing near their bases are numerous plants of *Helonias bullata.* Since *Magnolia virginiana* and *Helonias bullata* have more or less completely invaded the coastal plain since the uplifts of the valley peneplains, the occurrence here of these two relic members of the Tertiary flora with the other extremely coastal plants strongly suggests the residual theory as an explanation for the occurrence of the coastal species in this region.

The swampy meadows present a different aspect in general. These are formed as a result of slight depressions where moisture is abundant during most of the year. Certain of these are inundated especially in the fall, but dry up as the summer months progress. The vegetative appearance is decidedly sedgy and grassy, but the sedge growth occupies certain parts and is not generally scattered over the meadows. Consequently for less vigorous plants competition is not so great. The American cranberry, *Vaccinium macrocarpon,* creeps near the bases of the sedges, forming extensive patches over large areas in the meadows.

Kennedy Mountain Meadow resembles a shallow basin in outline and lies in the heart of the flatwoods of the Blue Ridge. A woods road runs nearby and gives access to the spot. On the edge of this meadow plants of *Rhexia mariana, R. virginica,* and *Sabatia gracilis* form entanglements with cranberry vines. The Compositae have several coastal representatives here, *Solidago tenuifolia* and *Boltonia asteroides.* Also this meadow is the type locality for *Helenium virginicum* Blake. *Aletris farinosa* is a typical liliaceous plant of the surrounding area. *Spiranthes Beckii* grows on the sandy banks adjoining the meadow.

A short distance from Kennedy Mountain Meadow there is a more extensive cranberry meadow in which numerous coastal species are growing. *Panicum virgatum* is particularly conspicuous here. The dwarf *Gaylussacia dumosa* var *Bigeloviana* and *Salix tristis* add diversity to the coastal element.

In the meadow adjoining Mountain Lake which comprises a major part of Shenandoah Acres there are several additions to the coastal list. *Xyris caroliniana* grows here with *Gerardia purpurea, Solidago tenuifolia, Rhexia mariana, R. virginica,* and *Xyris flexuosa.*

In the dampest spots of the meadow *Rynchospora gracilenta* is abundant. The spikes of *Aletris farinosa* stand out conspicuously among the sedges. *Gaylussacia dumosa* var. *Bigeloviana* adds to the scrubby appearance of the meadow.

Another meadow in this region is locally called Hattan's Pond. This is a much overgrown cranberry bog. The coastal Red Root, *Lachnanthes tinctoria* and the Blunt Manna Grass, *Glyceria obtusa,* make their appearance here.

The ponds present an interesting problem. As the underlying rock where these ponds appear is limestone and dolomite concealed by overthrusting or by talus and wash at the foot of the Blue Ridge, it seems reasonable to think of these ponds as filled-in limestone sinks. The ponds are fed by numerous springs and are therefore permanent.

Blue Pond is a small, rather deep basin near Sherando. The interesting plant which it contributes to the coastal list is *Utricularia radiata.* Its radiating inflated petioles are conspicuous, and float among numerous species of *Potamogeton.*

The largest pond in the region is Spring Pond supporting the growth of a number of aquatics and providing favorable habitats on its margin for a diversified flora. *Orontium aquaticum* is noticeable in the broad expanse. Arising near these is the coastal pipewort, *Eriocaulon septangulare.* Several species of *Utricularia* are here, e.g., *U. gibba* and *U. clandestina.* The last is particularly noteworthy as its range is hereby extended from Pennsylvania to Virginia. When collecting this *Utricularia* one finds its finely dissected stems intermixed with *Spirogyra* scum and *Potamogeton* leaves, and adhering to the glutinous stems of *Brasenia Schreberi.* On the sphagnum hummocks surrounding the pond a number of species of orchids may be found with *Drosera rotundifolia, Bartonia virginica, Dulichium arundinaceum,* and *Eriophorum virginicum.* On the overgrown edge *Rhododendron viscosum* and *Gaylussacia dumosa* var. *Bigeloviana* stand out as coastal species.

Mountain Lake is a part of Shenandoah Acres and is centrally located in the area considered. The lake itself exclusive of the meadow has a significant addition. *Utricularia fibrosa* is rooted near the edge of the lake in sand that is only slightly covered with water.

Green Pond is strikingly different from the other ponds in its vegetative aspects. The Spatter Dock, *Nymphaea advena,* has taken complete possession of the pond to the exclusion of other aquatics. However, near the edge *Hibiscus palustris, Stachys hyssopifolia, Eupatorium rotundifolium* var. *ovatum,* and *Hypericum petiolatum* are thriving. Of these the mallow stands out as being most unusual for the region as it appears to be a plant of the sea levels.

The Maple Ponds comprise three ponds, one of which is permanent. The characteristic plants around these are *Woodwardia virginica* and *Steironema radicans.* Professor M. L. Fernald, while collecting plants in the inner coastal plain of southeastern Virginia during the summer of 1936, found plants resembling the latter species listed in Gray from Virginia, but yet not identical to the true species (FERNALD, p. 438). He writes, "Our material, though very inadequate, can be matched only in that species, but it shows an inclination to whorled leaves and its flowers are all solitary on simple peduncles in the axils of the primary leaves, instead of being borne on axillary branches as in most true *S. radicans.* Fuller material may show the plant of southeastern Virginia to be distinct."

Fernald classes it primarily as a species of the Gulf Coastal Plain, with only local colonies on the Atlantic Coastal Plain or its extensions. Material similar to that collected by Fernald has been found around Maple Pond. Therefore, if accepted for that species it is necessary to explain its presence in the region by considering the relation between peneplanation in the valley and gulf regions. Is it possible that during the retreat of this species from the valley that it followed the direct line of peneplanation from the valley to the gulf region, following uplifts?

An explanation for the occurrence of such a large number of distinctly coastal plants is here offered. It is more or less in accordance with the physiographic history of the Valley and Blue Ridge Provinces.

In the region discussed " a crystalline oldland on the southeast was overlapped by Paleozoic sediments on the northwest; the inner margin of these sediments was involved in folds which were closely compressed near the oldland, becoming more open and finally disappearing toward the northwest; the entire area was more or less perfectly peneplaned, and later uplifted with warping; the uplifted peneplane (usually called the ' Cretaceous peneplane ') was then maturely dissected in hard rock areas and reduced to a new peneplane (usually called the ' Tertiary peneplane ') in new rock areas; the whole was finally uplifted again and further dissected " (WRIGHT, p. 1).

When considering " Drainage Changes in the Shenandoah Valley Region of Virginia," Watson and Cline presented some interesting facts concerning the physiographic history of the region (WATSON & CLINE, p. 355). It is indicated in their paper that the region now occupied by the Shenandoah Valley has been subject to erosion since the close of the Paleozoic era. Four distinct cycles of erosion (peneplanation) are defined.

In the Kittatinny Cycle the entire region was reduced to a peneplane except in hard-stone areas in the Allegheny Ridge and the Blue Ridge. The cycle was completed in Cretaceous time and left as remnants on mountain-tops in hard-rock areas.

An uplift of the Kittatiny Plain rejuvenated the streams and a second cycle of erosion was inaugurated in early Tertiary.

At the close of the Tertiary Cycle streams were rejuvenated by uplift of the region and a new cycle designated as the Shenandoah plain in the valley limestone.

A third uplift of the region brought the Shenandoah cycle of erosion to a close, and thus was entered upon a new or recent cycle of erosion in early Pleistocene.

It is evident that during the series of later cycles when the Valley Province and the lower flatwoods of the Blue Ridge were peneplaned that the majority of coastal species were present here, thriving under conditions similar to those they now realize in their coastal environment. However upon uplifting, conditions became unfavorable over much of the valley region where the valley peneplane was developed most extensively. Consequently the species were unable to survive in their original home, and retreated to the newly formed coastal plain.

The region around Stuart's Draft is somewhat different from other parts of the valley in being at a much lower level. Wright finds that there is a distinct slope from the northwestern to the southeastern side of the valley, and remarks that such a slope is noticeable in the region around Stuart's Draft, where there is a lower level probably representing a more recent cycle or stage (WRIGHT, p. 31).

Now it is entirely possible that the coastal species of the Tertiary flora and later found this particular region adaptive to their needs, and were able to survive here. At least evidence points in that direction from the numerous relics of the Tertiary flora that appear here, and that have in more recent times retreated to the coastal plain. Species present in the area and listed by Fernald as true relics of Cretaceous or early Tertiary flora comprise a fairly large list of which may be cited *Helonias bullata, Magnolia virginiana, Orontium aquaticum, Parnassia asarifolia, Galax aphylla, Stachys hyssopifolia, Houstonia tenuifolia, Trillium pusillum, Rhexia mariana, Monotropsis odorata, Quercus marilandica, Clitoria mariana, Gentiana Saponaria,* and *Diodia teres.* Now if these relics which have in comparatively recent times invaded the coastal plain, were able to adjust themselves in the bogs, ponds, and grassy meadows, there is no convincing reason why the characteristic coastal species may not all be considered members of a relic flora that were present in the valley and the lower flatwoods of the Blue Ridge during its peneplain status, and that became segregated during the plant recession.

In connection with the residual theory it appears significant to express Professor Fernald's views as interpreted from several of his papers (FERNALD, p. 484).

Upon considering the members with colonies on the Appalachian Upland (or sometimes the Ozark Upland) Fernald states that they are probably more numerous than indicated by his lists. " Every serious exploration in these areas brings new cases to attention and I have doubtless wrongly classified a great many. These plants are of peculiar interest because, occurring on the old and now elevated core of eastern North America, they seem to be true relics of the Cretaceous or early Tertiary flora which, upon the elevation of the old Cretaceous peneplane from its sea-level status, partially moved outward to the newly available Coastal Plain. This general situation has been discussed or outlined several times and more and more the evidence accumulates that many species now characteristic of the Coastal Plain were formerly on the ancient core of eastern North America, in our latitude the Appalachian and Ozarkian Uplands. Some students maintain that Coastal Plain species are moving into the ancient uplands. They may be right in this interpretation. In general, however, it seems to me more probable that plants and animals of long-established and conservative groups should have moved out from the ancient lands during pronounced changes due to uplift and have entered the newer or younger areas as they became available for occupation, than that groups already conservative should have arisen upon the very young areas and then have intruded themselves successfully into the old regions where ancient series of species were already in possession."

So the occurrence of coastal species in southeastern Augusta County may be cited as another instance where the physiographic features have been favorable for the survival of these plants.

ACKNOWLEDGMENTS

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UNIVERSITY OF VIRGINIA

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Dirca palustris in New Castle County, Delaware

ROBERT R. TATNALL

As far as I can discover, *Dirca palustris* has been definitely reported from but three stations in Delaware. Naturally these are all in New Castle County, the only county which emerges from the Coastal Plain. The three localities are those mentioned in Keller and Brown's Flora of Philadelphia and Vicinity.

One station is described in Keller and Brown as " Brandywine Creek, north side above Market Street ". This is in the city of Wilmington, and is the place referred to in Edward Tatnall's Catalogue of Plants of New Castle County, 1860, as " Sandy open woods near Brandywine Bridge. Frequent ". There has been no *Dirca* here for at least fifty years.

Another station is, or was, on a rocky hillside at Mount Cuba, where William M. Canby and Albert Commons found it in the 1860's, and several Philadelphia botanists collected it in the 1890's. When I first learned of this locality, I was told that the " stand " had become reduced to a single plant. Repeated search in recent years has failed to disclose it, and it probably no longer exists.

The remaining station (" above Rockford ",—Keller and Brown), is more fully described as on low, wooded, rocky soil, west bank of Brandywine Creek, ¼ mile below the Henry Clay bridge, and about 500 feet below the DuPont dam,—the dam which supplied power to the " lower powder yard " half a century ago, and now serves the DuPont Experimental Station. A few days ago (on April 29, 1939), I visited the place, and took a census of the plants then to be seen,—easily " spotted " at this season, even from a considerable distance, by their brown bark and numerous yellow flowers. About midway between the margin of the stream and the foot of an embankment which formerly carried the tracks of a trolley line, I found a clump of the shrubs, which I have seen nearly every spring for a number of years. Formerly there were seven plants here; now there are nine, the tallest about seven feet high, and all within a circle of some six feet diameter. About 20 feet southeast of this clump is a single flourishing individual. Three others, present a few years ago, have disappeared. These ten specimens are probably all that are left of Leatherwood in Delaware. Possibly the stand is still " holding its own ", but more likely it is facing extinction at a not distant date.

Further Additions to the Flora of Bucks County, Pennsylvania

WALTER M. BENNER

The first list of additions to the Flora of Bucks County, Pennsylvania appeared in Bartonia 15: 32-34. 1933. Since that time several other species to be added to the list of Bucks County plants have come to the writer's attention, partly through additional collecting and partly through further study of earlier material. The following annotated list includes all of these new species:

DRYOPTERIS PHEGOPTERIS (L.) C. Chr.

Moist shaded river bank (Delaware River) in front of Nockamixon Inn, Upper Black Eddy, August 3, 1925, Rodney H. True.

This specimen is in the University of Pennsylvania Herbarium. On June 26, 1938, Dr. Edgar T. Wherry rediscovered this station and contributed a specimen to the Herbarium of the Philadelphia Botanical Club. On the label Dr. Wherry notes that the fern occurs in a very small colony, barely maintaining itself.

This is a fern of northern affinities and is rare in our area. It had previously been collected locally in Northampton, Lehigh, Berks and Philadelphia counties in Pennsylvania. In Philadelphia it was found in the Wissahickon Valley. The vicinity of Upper Black Eddy has a considerable number of northern species and it seems quite fitting for the beech fern to occur there.

CYPERUS BREVIFOLIUS (Rottb.) Hassk.

Border of dredged sand over tidal marshes near the mouth of the Neshaminy Creek, southeast of Eddington, September 24, 1932, Bayard Long 38543 and 38547, and October 9, 1932, Bayard Long 38778.

Material of collection number 38547 was referred to Prof. M. L. Fernald for an opinion. He determined it as belonging to the above species and wrote concerning it as follows: "This is a member of the subgenus *Kyllinga,* pantropical in range and occurring native northward to Florida and Georgia. We have an old Centennial Ground (Philadelphia) specimen collected by Burk in 1878."

This species was found growing on sand which had recently been dredged from the channel of the Delaware River, and with it were associated, among other things, *Cyperus erythrorhizos* Muhl. and *Cyperus speciosus* Vahl.

STELLARIA AQUATICA L.

Alluvial thicket on east bank of Mill Creek, ¼ mile north of Rushland, June 7, 1938, Edgar T. Wherry.

This is an adventive from Europe which was first collected in the local area on old ballast in Philadelphia by C. A. Boice in 1879. Since then it has made its appearance at a few stations in Montgomery, Delaware, and Chester Counties in Pennsylvania and also in New Castle County, Delaware.

MYRIOPHYLLUM PROSERPINACOIDES Gill.

In pond at north end of Maple Beach, southwest of Bristol, October 31, 1937, Louis E. Hand.

A native of Chile which is frequently cultivated and which is obviously becoming abundantly naturalized locally. It is naturalized in ponds at nearby New Jersey stations including one south of Trenton, Mercer County, another one and one-half miles south of Burlington, Burlington County and near Haddonfield, Camden County.

EUPATORIUM ROTUNDIFOLIUM L.

Along roadside, 0.5 mile west of Bristol, August 21, 1938, Louis E. Hand.

This is a plant of the Coastal Plain and its occurrence on the Coastal Plain strip of lower Bucks County was not surprising. In fact, it seems more surprising that it was not detected there sooner. This part of the county will probably yield other species of like affinity from time to time, especially the less conspicuous ones, where intensive exploration is carried on.

There are only two other collections of this species from southeastern Pennsylvania, one from near Willow Grove, Montgomery County and the other from Tinicum, Delaware County.

LEONTODON NUDICAULIS (L.) Banks

Grassy roadside bank near the village, Eddington, July 1, 1931, Bayard Long 33458.

An adventive from Europe which was erroneously reported under *Hypochaeris radiata L.* and is the sole basis for the record in the Flora of Bucks County, Pennsylvania 307. 1932. The other local stations for this species are on ballast, Camden, New Jersey, on lawns, Cape May, New Jersey and on ballast, Philadelphia, Pennsylvania.

HIERACIUM VULGATUM Fries.

Dry sandy oak woods, southeast of Eddington, September 2, 1933, Walter M. Benner 5406.

A native of Europe which is occasionally found as a weed in eastern Canada and the northeastern United States. Locally it was known previously only from Grenloch, Camden County, New Jersey, and from Camp Hill in Montgomery County, and Mount Airy and Chestnut Hill in Philadelphia County, Pennsylvania. Mr. R. B. Farley was the discoverer of the Eddington station but he did not collect any herbarium material.

A Northern and a Southern Plant in York County, Pennsylvania

EDGAR T. WHERRY

Arisaema stewardsonii is well known to grow in the Appalachian mountains and farther north, and is naturally regarded as a northern species. The finding of it in May, 1938, along Muddy Creek, ½ mile southeast of Woodbine, York County, was therefore unexpected, especially in that this locality lies in the Piedmont physiographic province at latitude 39° 47′ and at an altitude of only 300 feet. The plant is however, typical, differing from the associated *A. triphyllum* in later blooming date, more slender habit, greener under side of leaflets, and strongly white-fluted spathe. Interestingly enough, one clump had features exactly intermediate between the two, evidently representing a hybrid.

Rhododendron atlanticum, in contrast with the plant just discussed, is decidedly southern in geographic relationship. Rehder, who made the accepted name combination, gives in his "Manual of Cultivated Trees and Shrubs" (p. 700) the range "Del. to S.C."; and in Small's "Manual of the Southeastern Flora" (p. 996) it is ascribed to the Coastal Plain of these states. Mr. Joseph B. Gable, of Stewartstown, York County, has found it, however, at a number of places in that vicinity, to several of which he guided us in May, 1938. It proved to grow in moist, mediacid, humus-rich loam on oak woods on gentle slopes near watercourses. These stations lie well above the Fall Line, around latitude 39° 44′, and longitude 76° 35′, at 650 to 750 feet altitude. Its range should therefore be stated as: Coastal Plain to Piedmont, S. C. to s. Pa. At two localities it was accompanied by *Gaylussacia dumosa,* a rarity in the Piedmont.

The York County plants of *Rhododendron atlanticum* are chiefly rather low-growing, with glaucous-backed leaves averaging 4 cm. long on glabrous to moderately hairy but eglandular petioles. The buds, on developing in April, bear prominent stalked glands, a good diagnostic character of the species. The fragrant flowers open in May, their corollas ranging from white to fairly deep pink, with the tube practically glabrous inside. Variants may show taller stature—up to 1.5 meters; non-glaucous leaves; glandular petioles; and so on. The species could be separated into several subspecies or varieties if these variations would only correlate, but unfortunately they rarely if ever do so, and once splitting was started, it would have to be carried to impractical extremes.

Unpublished Colored Plates of Fungi by Lewis David von Schweinitz

Louis C. C. Krieger

Shear and Stevens[1] state that in the library of the Academy of Natural Sciences at Philadelphia there are three folio volumes of unpublished plates painted by von Schweinitz entitled " Fungi Nieskiensis Icones," while a fourth (marked Pt. I, of the same series) is said to be in the possession of Mrs. W. A. (Emily de Schweinitz) Lemly, of Winston-Salem, N. C., a granddaughter of the illustrious pioneer in American mycology.

In reply to a letter of inquiry, Mrs. Lemly recently informed Dr. Kelly that the books (sic) of paintings of fungi formerly owned by her were presented to the Academy some years ago.

Miss Adelaide L. Fries, also of Winston-Salem, and a great-grand-daughter of von Schweinitz, writes Dr. Kelly of a tradition in her family which says in effect that her grandfather, Bishop Emil de Schweinitz, had four notebooks containing sketches of mushrooms, etc., but when an effort was made to locate the books, only three were found, and these were placed in the Academy library.

The above cited authors further state that the late Mr. Eugene A. Rau, of Bethlehem, Pa., knew of the one-time existence of six or seven volumes of Schweinitzian paintings, these having been lent to him by the mycologist's son, Bishop Edmund de Schweinitz. Since but three of the " six or seven " are thus accounted for, the question arises, What has become of the fourth, not to mention the fifth, sixth and seventh?

As anything from the hand of this preeminent man is of the utmost importance to mycology, Dr. Kelly was pleased when a volume of Schweinitz plates was brought to his notice through the good offices of Mr. Samuel N. Rhoads, the well-known bibliophile of Philadelphia. Mr. Rhoads advised that he had compared the plates with those in the Academy set and had found that many of the former were copies of the latter; also that the present volume was bought by the late Benjamin M. Everhart at an auction in Philadelphia in 1876 (Everhart's book-plate, bearing the printed date, 1883, is still inside the front cover); and that beyond the rumor that it is said to have belonged previously to the J. L. LeConte library, nothing is known of its earlier whereabouts. At present it reposes within the Herbarium of the University of Michigan, at Ann Arbor, a gift of Dr. Kelly.

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[1] Mycologia 9: 199. 1917.

The volume is a large folio about 8 cm. thick, with boards measuring 20 by 30 cm. Back and corners are dark-green morocco, while the sides are covered with marbled, yellow-brown paper. Stamped in gold on the back are the words, " Icones Fungorum." Inside, not bound in, were found two lists of fungi, both in the handwriting of de Schweinitz. One is addressed to " Mr. T. G. Kummer, Bethlehem, Northampton Cnty, Pennsylvania." The other appears to be a check-list for a contemplated treatise of which the plates were to form the atlas, for, appended to the names of some species, are remarks such as " icones sine descriptionibus ", and, " descriptio sine icone ". There are 301 plates on which are figured 710 species.[2] Many of the species described as new, but not figured, in the work written together with his teacher, Albertini,[3] are beautifully illustrated in the present volume.

The paintings are grouped in the systematic order followed in von Schweinitz's day, and the nomenclature employed is that of the first decades of the last century. *Boletus*, for example, includes all porous species, fleshy and woody; *Leotia* takes in *Vibrissea; Agaricus* is used to designate all fungi with gills, except *Amanita* and *Merulius,* the latter being our *Cantharellus,* in part; *Clavaria* comprises *Typhula, Pistillaria,* etc.; *Hydnum* means all dentate forms, and *Peziza,* any cupulate species, large or small, bearing asci.

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[2] An index to these species has been prepared by Mr. Krieger, and it is hoped that this can be eventually published along with similar information concerning those in the other volumes of Schweinitz's plates.—EDITOR.

[3] Albertini and Schweinitz, Conspectus fungorum in Lusatiae, etc. 1805.

Arthur N. Leeds

Francis W. Pennell

On January 26, 1939 the Philadelphia Botanical Club suffered a severe loss in the death of Arthur N. Leeds. For just forty-six years he had been the Club's Treasurer, and his genial presence had given charm to our meetings while his interest had played a large part in making continuously effective our work as a scientific society. For the existence of Bartonia his support has seemed so essential, that it becomes a sad duty now to undertake the preparation of an issue without the possibility of conference with him. Not only was there his lively interest in the subject matter, but also the assurance that he would go far beyond his responsibilities as Treasurer to see defrayed the necessary expenses of publication.

Born in 1870 Arthur Leeds was a young man of twenty-one, when with his older brother Morris, both recent graduates of Haverford College (Arthur, B.S. in 1889 and A.M. in 1890), he attended a meeting sponsored by Dr. J. Bernard Brinton at the Academy of Natural Sciences; thus it was that on December 22, 1891, he became one of the founders of the Philadelphia Botanical Club. It was in January, 1893, that he succeeded Isaac C. Martindale as the Club's second Treasurer. Arthur used to say that it was his chief ambition to fill this post for fifty years, but by his request a new appointment was made this past January at the small meeting which chanced to be held on the very day of his death. As our President remarked, in so " carrying on " we were but doing as Arthur would have wished.

Most of Mr. Leeds' life was of necessity devoted to business. After ten years with the Millville Manufacturing Company, he acquired the dominant interest in a woolen mill at Manayunk, being President of the Wabash Mills Company until his retirement in 1926. Then, with freedom, he made a leisurely tour around the globe in company with Dr. Charles W. Townsend, an ornithological friend and fellow-sharer of many cultural interests. Hawaii, Japan, India, Egypt, Spain, were countries visited, and especially in the last Arthur lingered with delight, only returning to Philadelphia in the summer of 1928.

Member of various social and intellectual clubs, Mr. Leeds' interests turned to the historical and artistic as well as to the scientific. He was active in philanthropical interests especially of the Society of Friends, being for some years Treasurer of the Alumni of Westtown School, President of the Friends' Historical Association, an Overseer of William Penn Charter School, etc.

During his business years Arthur Leeds' botanical interest turned increasingly to the study of ferns, so that in 1928 it seemed a natural thing to have him extend this to the assumption of oversight of the collections of Pteridophyta in the herbarium of the Academy of Natural Sciences. At first he received our invitation with diffidence, feeling his lack of special scientific training, but, soon realizing the work to be done in the organization of the collections both geographically and taxonomically, he gave himself wholeheartedly to what was to become the great interest of his remaining years. From the beginning of 1929 he had at the Academy his private secretary who, after caring for his own correspondence, gave her remaining time to the preparation of specimens for the institution; most of her time actually came to the Academy, and her mounting filled the needs of both Fern and Local Herbaria. Mr. Leeds' own energy was given to organizing and developing the Pteridophyte collections, seeing to the arranging of specimens in sequence of states and countries, to the discriminating identification of the material, and to the acquirement, often by his own purchase, of valuable collections for the series. He has left the fern herbarium in model condition.

For the proper study of Pteridophyta Mr. Leeds acquired many taxonomic works, so that aften ten years his botanical library had grown into a collection of 1060 books and pamphlets, among which were over 70 books and doubtless many pamphlets unrepresented in the Academy's own library. By bequest nearly all of these have been presented to the Academy, most of them serving to develop the working library of the botanical department. In grateful acknowledgement each will bear a label indicating its source.

It was only in 1931, after he was sixty years of age, that Arthur Leeds commenced scientific publication. Increasingly he was acquiring that mastery which led us to hope for larger contributions to the knowledge of Pteridophyta. At first he worked only with ferns of the eastern United States, but later he was naming his own collections from Mexico while his last large task was the identification of those which I had collected in that country in 1934 and 1935. So far as known the following comprise all his botanical publications:

"The Pennsylvania Stations of Arceuthobium pusillum."—Rhodora 33: 191-192. 1931. (In 4 counties of northeastern Pennsylvania.)

"Is Polypodium vulgare var. Churchiae Gilbert a Polypodium?"—American Fern Journal 23: 8-12. 1933. (Decides that it is a *Dryopteris, D. marginalis* f. *Churchiae,* comb. nov.)

"A Nomenclatorial Trifle."—American Fern Journal 26: 106. 1936. (Identifies *Pteris thalictroides* Muhl. as *Pellaea atropurpurea* (L.) Link.)

"The Hart's Tongue Fern in Maryland."—American Fern Journal 26: 122. 1936. (Occurrence of the European *Phyllitis Scolopendrium* in a rampit at Darlington.)

"As to *Asplenium ebeneum* var. *Hortonae.*"—American Fern Journal 27: 30-31. 1937. (Mistaken for var. *incisum* Howe, but clearly different, and found in 1935 by Dr. E. T. Wherry in York County, Pennsylvania.)

(With Francis Harper)

"A Supplementary Chapter on Franklinia alatamaha."—Bartonia 19: 1-13. 1938. (Discusses the flowering season, type locality, and ecological distribution of this tree found in the eighteenth century but now unknown in nature, with summary of the repeated searches for it and of the possible causes of its extinction.)

Any account of Mr. Leeds would be incomplete without picturing him afield. During his decade at the Academy he loved to spend several months each year in the southeastern states, especially in the Appalachians. Usually he would go alone in his automobile, simply dropping out of touch with home contacts for a while. Sometimes he had companions, and Dr. Francis Harper has been so fortunate as to share in a journey north from Harper's beloved Okeefenokee Swamp in Georgia. (Just now Dr. Harper is himself traveling alone on a long quest of the trail of John and William Bartram, a trip that Leeds and he had keenly counted on sharing together.) All through his life Arthur Leeds loved the open, canoeing and camping, and was a sharer of these delights with his friends. Through him the hospitality of the Fourway Lodge near Mays Landing in the New Jersey Pine Barrens was extended to many.

The last two years of his life contained much suffering, always met bravely and cheerfully. Both the last summers were largely passed in the hospital, but an operation a year ago led to the genuine hope that he was safely on the road to recovery. Last autumn he seemed again his old self, and his friends believed that danger was over. But at the close of the year he sank again, and within a month was gone.

Of all the words of tribute said of him none are more apt than that Arthur Leeds possessed a " genius for friendship ". At his funeral these original verses from one who knew his life, botanical and social, were read, and we are glad that M. M. C. consents to have them preserved in our appreciation of him:

" Thou who hast opened doors for us down spacious ways,
Careful explorer of the wonders here at hand or far afield,
Naturalist, scientist, but most of all our friend, our well-beloved friend
Down all the years:—we give thee tribute for thy matchless flame,
Deep sharer of our happiest days but also fully knowing
All of our losses and our pain. Oh joy of well-remembered days
Of swamp and field and wood, of freshened life from flaming logs
Piled high into the night, where talk goes deep finding itself communion.

We know that Spring will come again and all the earth be green,
Under the leaves we know that we shall find arbutus still,
Hunting, we may even find Schizaea in that elusive bog,
And with our flashlights in the piney woods, bright eyes may shine:—
We know that thou most valiantly wouldst have us hide
Our emptiness, our loneliness in missing thee, courageous friend,
Yes, it must be, that we shall walk the April woods again,
Face forward, eagerly, even as thou, into a bright new day."

The Botanical Work of Witmer Stone

FRANCIS W. PENNELL

In the death of Witmer Stone on May 23 the Philadelphia Botanical Club has lost yet another of its founders. Although the main work of his life lay in other fields than botany, Dr. Stone was intimately associated with the growth of our club, and contributed greatly to it. As one after another of our older members has gone, it has been our custom to appeal to Dr. Stone for some account of their personality and work, and readers of Bartonia will recall his sketches of Charles S. Williamson, Stewardson Brown, W. A. Poyser, Ida A. Keller, John W. Eckfeldt, and Joseph Crawford. Now it becomes our sad duty to prepare some account of Dr. Stone himself.

Beyond all others of our time Witmer Stone stands out as a naturalist, a man who believed in the study of nature by observation and whose interests were widely spread over the vast territory of natural science. His published studies chiefly concern birds, mammals, and flowering plants, but his knowledge was yet broader, and one of the memories of my earliest days at the Academy is being referred to him for the identification of a myriopod. His wealth of experience was at the command of all, and his information always generously and genially given. One can understand what for over twenty years he imparted to the editing of the Auk, the leading American ornithological journal — among all journals of natural history I know of no other which in its reviews of current literature and its discussions so happily serves those working in its field.

Dr. Stone was born in Philadelphia September 22, 1866, the son of Frederick D. and Anne E. Witmer Stone. His father was for many years librarian of the Pennsylvania Historical Society, and it is evident that the boy came into a home where intellectual interests were dominant. In his account of Stewardson Brown (in Cassinia for 1920 and Bartonia for 1924) we are given a glimpse of Stone's own boyhood. On entering the Germantown Academy in the autumn of 1877 he found as a classmate Amos P. Brown, in after years professor of geology at the University of Pennsylvania, and through him came to know his younger brother Stewardson. " We three boys had very many interests in common—a love of nature, of music and of out-door athletic exercises—and we became inseparable companions. Indeed for a period of more than ten years we spent almost our entire spare time at Restalrig [Brown's home] or in the vicinity mainly in collecting and studying specimens of plants, animals and minerals." These boys, with Witmer's brother Frederick and with still more of the Brown brothers, established the " Wilson Natural Science Association ", which met at the Stone home " where a room had been transformed into a museum for the housing of our collections". Witmer's leadership seems evident in the fact that the juvenile club was named for an ornithologist. The society prospered, and through the preparation of papers for their weekly sessions the boys learned to formulate their observations in words.

It was Witmer's and Amos' good fortune to become students at the University of Pennsylvania, the former receiving his A.B. in 1887. Of this class, comprising so many subsequently distinguished members and so remarkable for its peculiar loyalty to the University, Witmer Stone became permanently the Secretary. In 1888 commenced Stone's lifelong association with the Academy of Natural Sciences of Philadelphia, and in 1891 he became Conservator of its Ornithological Section. His interest in birds remained dominant throughout his life, leading to the publication of many papers and books about them, and, as we have seen, to his long editorship of the Auk. But he wrote upon mammals also, contributing to the well known Nature Library and to the series of reports from the New Jersey State Museum. In 1913 he was honored by the University of Pennsylvania with the degree of Sc.D. At the Academy his services were needed for practical as well as scientific matters, so that from 1918 he was Executive Curator and from 1925 to 1928 Director of the Museum. After this he was able to relinquish some of his load, becoming Emeritus Director. It is sad when one of Stone's scientific ability must bear uncongenial administrative burdens, and it was under the pressure of these that he experienced his first break in health.

Over the course of these years Dr. Stone collected and studied animals and plants in many parts of North America. Although his expeditions were made primarily for birds and mammals, they yielded other groups of vertebrates, often such invertebrates as insects and spiders, and nearly always considerable series of plants. Beside what he gathered within our local area and on nearby excursions as far as the Catskill Mountains of New York and the Appalachians of western Maryland, the herbarium of the Academy was enriched by him with botanical specimens collected in 1888 on Bermuda; in 1890 in Yucatan whither he accompanied Dr. Angelo Heilprin; in 1907 and 1912 from the vicinity of Duluth, Minnesota; in 1914, 1917, 1919 and 1923 on the coastal plain of South Carolina; in 1919 on the Chiricahua Mountains of southeastern Arizona; in 1921 on the mountains of eastern Kentucky; and in 1935 in Louisiana. Of these the most extensive and notable were his plants from Yucatan, South Carolina and Arizona.

This account of Witmer Stone need not enumerate nor appraise his zoological contributions nor speak further of his work as the Academy's Director, activities which will doubtless be fully told elsewhere. Now we wish to follow his botanical interest. This seems to have been always evident, although it was most active between 1900 and 1915. As a young man he had shared in the weekly field trips led by Dr. J. Bernard Brinton. In 1891 he was one of that group of eight men, headed by Dr. Brinton, who met at the Academy of Natural Sciences on December 1 and there resolved to form an organization to be known as the Philadelphia Botanical Club—all of that first group are gone but of eleven members added before the close of the year and to be also accounted founders two yet survive. When the Club decided to establish its journal Bartonia, Stone was one of two on its publication committee, and he contributed to the first issue in 1909 an account of the rediscovery of *Lilaeopsis* in New Jersey. In the golden days of the Club's history, when a group of enthusiastic collectors met each month, when southern New Jersey was yielding its steady succession of novelties, when Van Pelt acted as Curator and each Christmas time displayed the new discoveries of the year—in those glorious days Stone was one of the most active of our members.

I have heard him tell how it was that for a decade he turned so assiduously to botany. Problems of geographical distribution always appealed to him, and it was possible to study the occurrence of plants with more satisfactory exactness than could be given to birds or mammals. He instanced southern New Jersey, with its locally restricted flora, but with no such localization of its bird life. In the preface to his " Plants of Southern New Jersey " he tells of his first visit to the pine barrens on a trip led by Dr. Brinton, and then of his resolution, after the joint meeting of the Philadelphia and Torrey Botanical Clubs at Toms River over July 4, 1900, to prepare a special Flora of the Pine Barrens. From that time followed trip upon trip with this special project in view. Always specimens were collected to support his records of plant-occurrence, and thus he assembled a large and accurately identified herbarium from New Jersey and elsewhere in our local territory.

So far as I have discovered Witmer Stone's first botanical paper was in 1902 and concerned a species of violet in the Pennsylvania mountains. At that time, and under the special incentive of the then most radical " Illustrated Flora " of Britton and Brown, botanists had come to realize that we have many species of *Viola* rather than the relatively few recognized by Torrey and Gray. To the clearing of this special problem Stone published in 1903 his most critical taxonomic plant study, " Racial Variation in Plants and Animals, with special Reference to the Violets of Philadelphia and Vicinity ". Among its thirty species is one well characterized and illustrated, but wrongly supposed to be *V. septemloba* LeConte—we may be glad that this striking species of a genus which Stone especially studied, subsequently named *V. stoneana* House, will perpetuate his name in our flora.

But most of Dr. Stone's papers over these years, in Torreya in 1907 and 1908 and in Bartonia in 1909, 1910 and 1911, are reports of plants being discovered in southern New Jersey, and pave the way for the appearance of his main botanical work, " The Plants of Southern New Jersey, with Especial Reference to the Flora of the Pine Barrens and the Geographic Distribution of the Species ". This accompanied the Annual Report of the New Jersey State Museum for 1910, but was so delayed as not to appear until the end of January, 1912—in fact, few copies were given out before mid-February. I well remember being one of the small party bidden to Dr. Stone's house on St. Valentine's, February 14, and there in the course of a happy evening receiving mysterious parcels, each of which proved to contain an inscribed copy of the anxiously awaited Flora. There were apt verses accompanying each, for Stone was a master of such improvisations.

It seems hardly necessary to tell the members of the Philadelphia Botanical Club of the merits of Stone's New Jersey Flora. For the first time it presented clearly the natural areas into which the flora of the Coastal Plain is divisible, outlining the anastomosing Middle, Cape May and Coast districts, the sharply separable Pine Barrens, and the Maritime Marshes. Plants were painstakingly identified, and the localities for the native species assembled under these headings. Probably for the first time within our area, the absences as well as the presences of species were given due geographic weight. The keys were all original, and formed for quick identification of species. In nomenclature zoological rather than botanical rules of procedure were followed; this called forth scathing criticism that may have temporarily blinded some to the actual worth of the work, though it stands forth increasingly with time as the most careful geographic study of any comparable part of the flora of eastern North America.[1]

It was about the time of the issuance of the " Flora of Southern New Jersey " that there appeared that whimsical and diverting booklet by R. W. Wood, " How to tell the Birds from the Flowers ". I have heard Dr. Stone relate how copies came to him from various friends, each bearing appropriate comments. But it was not such remarks that turned this versatile naturalist from botany, but the call to become editor of the Auk, a responsibility that he met most conscientiously. He only gradually relinquished active interest in botanical collecting and attendance at the meetings of the Philadelphia Botanical Club, but for nearly twenty years pressure of administrative duties and then increasing physical incapacity have made him a rare visitor with us. Over most of this time he would spend all the summer at Cape May, and this resulted in his last work covering his extensive observations of birds there. Sometimes, although more and more rarely, he would stop in the botanical department of the Academy to tell of some plant he observed. But Cape May was ground that had become classic through the exploration of twenty or thirty years before, and ravages due to man in this age of autos left little to be gotten new.

But in spirit Dr. Stone's interest in the welfare of the Philadelphia Botanical Club was something that could not lapse. Now that he has gone I can not do better than apply to him what he wrote concerning Stewardson Brown, for such words could fit no one better than Dr. Stone himself. " While technical knowledge and activity in research are admittedly necessary for the successful program of a club such as ours there would be no club were it not for further qualities exhibited in the membership. There must be personalities that hold us together—that inspire respect and affection and weld bonds of friendship that will not yield with the lapse of time". How many of us to the end of our days will feel a debt of gratitude to Witmer Stone for his encouragement to us during our formative years!

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[1] A further merit of the work, suggested by Dr. Stone but carried out by Mr. Bayard Long, is the careful calculation from actual preserved material of the seasons of flowering and fruiting. No other flora of this or nearby territory has such phenological exactness.

Botanical Publications

"*Viola renifolia* in the Pennsylvania Alleghanies." Torreya 2: 75. 1902.

"*Arisaema pusillum* in Pennsylvania and New Jersey." Torreya 3: 171-172. 1903.

"Racial variation in plants and animals, with special reference to the violets of Philadelphia and vicinity." Proc. Acad. Nat. Sci. Phila. 55: 656-699. *pl. 31-39*. 1903.

"Certain plant 'species' in their relation to the mutation theory." Science II. 23: 701-702. 1906.

"Some new plants for southern New Jersey." Torreya 7: 39-40. 1907.

"*Rynchospora rariflora* in southern New Jersey." Torreya 8: 16-17. 1908.

"The Coastal Strip of New Jersey and the rediscovery of Lilaeopsis." Bartonia 1: 20-24. 1909.

"New plants for southern New Jersey." Bartonia 2: 26. 1910.

"*Brachiaria digitarioides* from New Jersey." Bartonia 2: 26-27. 1910.

"*Corema conradii* in Ocean Co., N. J., east of the Plains." Bartonia 3: 26. 1911.

"The plants of southern New Jersey with special reference to the flora of the Pine Barrens and the geographic distribution of the species." Ann. Rep. New Jersey State Museum 1910: 25-828. *pl. 1-129* + map. 1912.

"Abama americana (Ker) Morong." Bartonia 4: 1-5. 1912. (Illust.)

"Charles Sumner Williamson." Bartonia 7: 1-5. 1915. (Portrait)

"The use and abuse of the genus." Science II. 51: 427-429. 1920.

"Stewardson Brown." Bartonia 8: 1-6. 1924. (Portrait)

"William Aldworth Poyser." Bartonia 11: 49-50. 1929.

"The work of William, son of John Bartram." Bartonia 12, Suppl.: 20-23. 1931.

"Ida Augusta Keller." Bartonia 14: 59-60. 1932.

"John W. Eckfeldt." Bartonia 15: 57-59. 1933. (Portrait)

"Joseph Crawford." Bartonia 19: 54-55. 1938.

As this is passing through press there arrives the November number of Rhodora in which, after showing that the name *Gentiana porphyrio* does not truly pertain to our Pine Barren Gentian, Professor M. L. Fernald proposes to call that plant *G. stoneana*. We are delighted that such an exquisite member of the southern New Jersey flora, one so admired by Dr. Stone, may ever be associated with his memory.

Reviews

Five Recent Books on Ferns

The year 1938 has been notable for the appearance of five works dealing with ferns which deserve notice here. First came a second edition of Clute's " Our Ferns in their Haunts ", under a somewhat modified title.[1] This 388 page book comprises a series of essays on the ferns of the eastern United States, taken up in groups, with numerous illustrations. At the back of the book are given brief keys to the genera, and to species of a few of them, along with a fuller key in which the features are illustrated by useful sketches. There is also a check-list of species, but it is very incomplete. An excellent test of the care taken by an author of a work on eastern ferns is to see how he handles the habitat of *Asplenium bradleyi*; for mere compilers are sure to copy the error perpetrated many years ago that this fern " prefers limestone ". (Actually it is one of our most acid-loving species, having never been authentically found on any calcareous rock.) We find that the present author has tried to compromise in the matter: " It is supposed to keep pretty close to the limestone, but has been found on sandstone in Missouri and Kentucky and on gneiss in Maryland," leaving one to infer that it perhaps does occur on limestone in the other states in which it grows. Throughout the work, in fact, there is similar haziness as to the haunts of all but the commoner species, and no obvious attempt to bring the habitat or range data up to date. The most unfortunate feature of the book, however, is the attitude as to taxonomy. After denouncing in no uncertain terms the people who change fern names, the author proceeds to change some forty or more himself, burdening the literature with combinations for which he gives no adequate excuse. For example, in the case of the highly distinct *Pellaea glabella,* a valid species if there are any in this genus, he considers that it will be " better placed in the fern world as *Pellaea atropurpurea* forma *glabella*."

Next appeared the posthumous work on the ferns and fern allies of the southeastern United States by Small.[2] This covers 517 pages, printed in rather small type, with most of the species illustrated by a full-page drawing, and likewise an illustrated key to genera. It includes notes on fern cultivation by W. A. Knight and a very full check list of species and synonyms, by J. H. Barnhart. The definitions in the 9-page glossary are too brief to be of much value. Here the data as to history, range, habitats, etc. have been worked out with care, though presented in a somewhat disjointed style. Most of the drawings are good, although those of the two Pellaeas do not represent very typical phases of either, and in the cases of larger ferns too small a portion of the frond is drawn to give the outsider any idea of what the plant looks like. This author's well-known tendency to split up standard taxonomic groups into smaller fragments has led here to the segregation of the deciduous grape-ferns into an independent genus *Osmundopteris* (giving *O. virginiana*), and of the dorsi-ventral Spike-mosses into *Diplostachyum* (giving *D. apodum, D. eatoni,* and *D. ludovicianum*). On the other hand species requiring detailed microscopic study of parts are in some cases lumped, as when all the arenicolous Selaginellas of southern Florida are included under *S. arenicola.* Several new species are described in the book, chiefly in the genera *Asplenium, Dryopteris, Thelypteris,* and *Ophioglossum,* but some of them are perhaps ecological forms or hybrids. *Dryopteris atropalustris* gives every indication of being *D. goldiana* X *cristata,* and *D. separabilis* is similarly *D. goldiana* X *intermedia.* An interesting contribution to nomenclature is the announcement that the fern generally known as *Dryopteris floridana* must on the grounds of priority of publication bear the name *D. ludoviciana.*

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[1] Our Ferns, their Haunts, Habits, and Folklore, by Willard N. Clute. F. A. Stokes Co., 1938.

[2] Ferns of the Southeastern States, by John K. Small. Science Press Printing Co., 1938.

The *Ophioglossaceae* have been monographed by Robert T. Clausen during the year.[3] The scattered literature on these plants has been assembled in convenient form in a 177-page pamphlet, with systematic treatments of successive taxonomic groups, including extensive geographic records, based on the material in some 20 herbaria. Of particular interest is the plan of subdividing species: when the recognizable segregates show well-marked geographic differentiation, they are classed as subspecies, but when their ranges are essentially similar they are made varieties, under species in both cases. Thus *Botrychium multifidum* is divided into the subspecies *silaifolium, typicum, robustum,* and so on, while *B. simplex* falls into varieties *typicum, compositum, laxifolium,* and *tenebrosum.* Unfortunately the distinction between these two categories is in most cases too subtle for the average person to appreciate, so it is doubtful if the plan will receive wide acceptance. The list of members of the family represented in the Philadelphia local flora area is, according to this monograph: *Botrychium multifidum* ssp. *silaifolium* (Presl) Clausen; *B. dissectum* vars. *oneidense* (Gilbert) Farwell, *obliquum* (Muhlenberg) Clute, and *typicum* Clausen; *B. simplex* vars. *typicum* Clausen, *laxifolium* Clausen, and *tenebrosum* (Eaton) Clausen; *B. matricariaefolium* ssp. *typicum* Clausen; *B. lanceolatum* ssp. *angustisegmentum* (Pease & Moore) Clausen; *B. virginianum* ssp. *typicum* Clausen; and *Ophioglossum vulgatum* L.

An exceptionally well-organized local fern-flora has been published for the state of West Virginia.[4] Each of the 76 species of ferns and fern-allies authentically recorded for the state is discussed, with keys, descriptions, habitat data,

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[3] A Monograph of the Ophioglossaceae, by Robert T. Clausen. Mem. Torr. Botan. Club, vol. 19, No. 2, 1938.

[4] The Pteridophytes of West Virginia, by M. G. Brooks and A. S. Margolin. W. Va. Univ. Bull., Ser. 39, No. 2, 1938.

ranges by counties, and remarks on noteworthy features shown in the area. Excellent illustrations of most of the species, prepared by the junior author, are presented on 16 plates in the center of the 60-page pamphlet. Four species attributed to the state by Millspaugh are not admitted, in view of the facts that their ranges lie remote from this state, and the reports are not supported by specimens; these are: *Botrychium matricariae* [i.e., *B. multifidum* ssp. *typicum* of Clausen's Monograph], *Dryopteris fragrans, D. filix-mas,* and *Cheilanthes feei.* One unexpected range-extension was discovered just in time to get in, however: *Trichomanes boschianum,* in Wayne County, 100 miles or so east of its previously known limit in Kentucky. Several other species not known in the state in Millspaugh's day are now authentically represented, notable cases being *Botrychium angustisegmentum, Lygodium palmatum, Pteretis nodulosa, Woodsia ilvensis, W. scopulina* (or a relative), *Dryopteris clintoniana, Woodwardia areolata, Asplenium bradleyi, A. cryptolepis, A. ebenoides, A. resiliens,* etc., also *Lycopodium inundatum* and *Isoetes engelmanni.* The compilation of data has been most carefully done, and errors such as detract from the value of so many local treatments of this kind are conspicuously absent.

The last of the series is an index to the names and synonyms of the ferns and fern allies of North America (north of Mexico).[5] Its 217 pages include alphabetical lists of the more than 700 species, varieties and forms which have been proposed, with the names relegated to synonymy tabulated. This will form a standard reference book for all workers who have to make use of fern names, and should be in every library.

E. T. W.

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[5] Index to North American Ferns, by Maurice Broun. Published by the Compiler, Orleans, Mass., 1938.

Program of Meetings during 1937

Date	*Subject*	*Speaker*	*Attendance*
Jan. 28	Large Trees in the Philadelphia Area	Dr. Edward E. Wildman	26
Feb. 25	A Botanical Collecting Trip to Haiti and the Dominican Republic, in 1935	W. Stephen Thomas	35
Mar. 25	Some Interesting Facts concerning the Geographic Relations of Diatoms	Dr. Ruth Patrick	16
Apr. 22	Plants Seen from the Great Lakes to the Gulf in 1936	Dr. Edgar T. Wherry	20
May 27	An Expedition to the Rain Forests of Jamaica	Prof. M. A. Chrysler	23
Sept. 23	Reports by Members on Summer Work		20
Oct. 28	Botanizing in the Hawaiian Islands	F. R. Fosberg	36
Nov. 18	Notes on the Distribution of the Flora of Eastern North America, as Illustrated by the Scrophulariaceae	Dr. Francis W. Pennell	20
Dec. 16	The Importance of Diversity in Plants	Dr. David D. Keck	23

Program of Meetings during 1938

Date	*Subject*	*Speaker*	*Attendance*
Jan. 27	A Summer in Colorado	Dr. Edgar T. Wherry	51
Feb. 24	Edinburgh, Cambridge and Kew: Observations of a Botanist at the Plant Congresses of 1935	Dr. W. G. Hutchinson	39
Mar. 24	Recent Studies on the Floral Areas of Southern New Jersey	Dr. John M. Fogg, Jr.	25
Apr. 28	Recent Botanical Work in Schuylkill County, Pa.	Paul R. Wagner	25
May 26	The Wild Flowers of Appalachia	Dr. Paul R. Stewart	37
Sept. 22	Reports by Members on Summer Work		11
Oct. 27	The Sundrops; *Oenothera*, Section *Kneiffia*, in the Local Area	F. R. Fosberg	37
Nov. 17	The Commelinaceae of the Local Area	Dr. F. W. Pennell	26
	Visit to the Giant Cypress of Tula	Mr. Samuel N. Baxter	
Dec. 15	Travels in Venezuela	Dr. E. W. Berry	20

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Dr. G. Harmer Patton, 61 E. Penn St., Germantown, Philadelphia, Pa.	1929
Dr. Francis W. Pennell, Moylan, Pa.	1910
Harold W. Pretz, 123 S. 17th St., Allentown, Pa.	1909
Dr. W. H. Reed, Jeffersonville, Pa.	1892
Robert L. Schaeffer, Jr., Haverford College, Haverford, Pa.	1938
Dr. J. R. Schramm, Dept. of Botany, University of Pennsylvania, Philadelphia, Pa.	1937
Miss Helen B. Shriver, 2004 Spring Garden St., Philadelphia, Pa.	1935
Lee Sowden, 3823 Oak Road, Germantown, Philadelphia, Pa.	1901
Dr. Walter Steckbeck, Dept. of Botany, University of Pennsylvania, Philadelphia, Pa.	1925
Hugh E. Stone, 431 Berkley Road, Haverford, Pa.	1892
J. Fletcher Street, 1120 Locust St., Philadelphia, Pa.	1918
Mrs. Kenneth E. Stuart, 367 Baird Road, Merion, Pa.	1933
Dr. Robert R. Tatnall, 1100 W. Tenth St., Wilmington, Del.	1928
Miss Grace M. Tees, Hillside School and Junior College, Norwalk, Conn.	1934
Arthur H. Thomas, Haverford, Pa.	1928
Horace E. Thompson, 5016 Schuyler St., Germantown, Philadelphia, Pa.	1920
William Thompson, 500 Spruce St., Darby, Pa.	1936
Miss Mildred T. Travis, 632 S. 62nd St., Philadelphia, Pa.	1938
Harry W. Trudell, 303 Highland Ave., Abington, Pa.	1915
Dr. Rodney H. True, Morris Arboretum, Chestnut Hill, Philadelphia, Pa.	1925
Paul R. Wagner, Ursinus College, Collegeville, Pa.	1935
E. Perot Walker, 206 Church Road, Ardmore, Pa.	1939
Robert F. Welsh, 132 S. 4th St., Philadelphia, Pa.	1909
Dr. Edgar T. Wherry, Dept. of Botany, University of Penna., Philadelphia, Pa.	1925
Dr. Edward E. Wildman, 4331 Osage Ave., Philadelphia, Pa.	1931

	Elected
Hans Wilkens, 241 S. 11th St., Reading, Pa.	1928
William H. Witte, R. D., Riegelsville, Pa.	1898
Miss Mary F. Wright, 538 Locust Ave., Germantown, Philadelphia, Pa.	1928

HONORARY MEMBERS

Samuel N. Baxter, Morris & Abbotsford Sts., Germantown, Philadelphia, Pa.	1918
Dr. Joseph S. Illick, State College of Forestry, Syracuse, N. Y.	1925
Edward Pennock, 243 Harvey St., Germantown, Philadelphia, Pa.	Founder

CORRESPONDING MEMBERS

Dr. John H. Barnhart, New York Botanical Garden, New York, N. Y.	1936
Otway H. Brown, R.D., Cold Spring, Cape May Co., N. J.	1908
Stewart H. Burnham, Cornell University, Ithaca, N. Y.	1911
Prof. M. L. Fernald, Gray Herbarium, Harvard University, Cambridge, Mass.	1929
Dr. A. Arthur Heller, Chico, Calif.	1893
Dr. Harold St. John, University of Hawaii, Honolulu, T. H.	1927
Charles F. Saunders, Pasadena, Calif.	1893
Dr. William Randolph Taylor, University of Michigan, Ann Arbor, Mich.	1921
Dr. Campbell E. Waters, Washington, D. C.	1904
Dr. Heber W. Youngken, Mass. College of Pharmacy, Boston, Mass.	1918

RECENTLY DECEASED MEMBERS

	Died
Arthur N. Leeds, Active	Jan. 26, 1939
Dr. John K. Small, Corresponding	Jan. 20, 1938
Dr. Witmer Stone, Active	May 23, 1939

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(**12S** denotes Supplement to No. **12**, the Special Bartram Celebration Issue)

(A) **Plants**

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